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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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March 16, 1992

Mr. Steven H. Wisness
Hanford Project Manager
U.S. Department of Energy
P.O. Box 550
Richland, Washington 99352



Leitch assigned
Forehand

Re: Review of RCRA Facility Investigation/Corrective Measures Study Work Plans
for the 100-NR-1 and 100-NR-2 Operable Units

Dear Mr. Wisness:

Enclosed for your consideration is the Ecology review of the Draft B RCRA Facility Investigation/Corrective Measures Study for the 100-NR-1 Operable Unit, and Draft A, 100-NR-2 Operable Unit Work Plans (DOE-RL 90-22, DOE-RL 91-46 respectively). In general, there is considerable improvement in the organization and information provided in these work plans compared with the last drafts.

Major issues with significant cost and scheduling impacts we wish to draw your immediate attention to include the following:

100-NR-1 Operable Unit

- o the proposed schedule contains no critical path definition, no target dates, and no interim milestones; milestones for treatability studies and submittal of a soils disposal option report will have to be included in the schedule
- o the proposed schedule includes at least a 38-month delay from completing the investigations and studies to commencing physical remedial action
- o there are no specific requirements for developing treatability studies or disposal options, which could significantly delay interim response actions
- o there is little description of coordination among USDOE-RL Operations, Waste Management, and Environmental Restoration Divisions for integration activities, yet indefinite delays for corrective actions cites these programs
- o Sections 3.1, 3.3, and 4.2 must be modified to include recent data and determinations from the Liquid Effluent Study Project Final Report, and be mutually supportive and internally consistent

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- o Section 5.1 and the Quality Assurance Project Plan lack sufficient detail to evaluate proposed investigations or consistency with Data Quality Objectives

100-NR-2 Operable Unit

- o the proposed schedule contains no critical path definition, no target dates, and no interim milestones; milestones for an interim response action at N-Springs and treatability studies will have to be included
- o the proposed schedule includes at least a 44-month delay from completing the investigations and studies to commencing physical remedial action
- o there are no specific requirements for treatability studies, which could significantly delay interim response actions
- o there are no specific requirements for sediment sampling necessary to refine the 100-N Area conceptual model and quantify off-site releases; vague references to 100 Area Aggregate studies are inadequate
- o there is insufficient information and data describing recent removal and remedial actions by USDOE-RL, or specific requirements in the work plan for field work to quantify biological contaminant pathways

We are confident that with continued diligent effort by all parties, these work plans can be approved no later than mid-June 1992. We propose that for purposes of tracking these comments and subsequent agreements, the NOD response table form used by RCRA staff be considered for these work plans. Please call Mr. Chuck Cline at (206) 438-7556 regarding comments on the 100-NR-2 work plan review, and Mr. Steve Cross at (206) 459-6675 regarding comments on the 100-NR-1 work plan review.

Sincerely,



Larry Goldstein
CERCLA Unit Manager
Nuclear and Mixed Waste Management

cc: Paul Day, EPA
T.B. Veneziano, WHC

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Washington Department of Ecology

100-NR-1 Draft B RFI/CMS

Review Comments

General Comments

Non-CLP analyses are noted for all source, soil, and ground-water samples. In other work plans either the full first round of samples or at least a portion of those samples are proposed for full CLP analyses. Because the sampling is limited in these operable units and results of these sample analyses will be used to make important decisions on whether to conduct IRM's, all or at least a portion of these first-round samples should be analyzed by full CLP methods.

Waste treatment technologies or process options are not clearly identified for each type of waste site (e.g., solid waste and soils) based on the contaminants of interest. Since existing site information has been analyzed and a conceptual understanding of the site has been obtained, preliminary corrective measure technologies and process options should be clearly specified in the RCRA facility investigation/corrective measures study (RFI/CMS) work plan to allow early determination of the need for treatability studies. Biological landfarming, thermal processing, soil washing, dechlorination, and stabilization/fixation are included as typical treatment options in the work plan. Without treatability studies for these technologies, many uncertainties exist with respect to performance, reliability, and cost. The work plan should discuss the need and present the schedule for treatability studies to evaluate the technologies for interim response actions.

The rationale for excluding the development of analytical methods and associated method detection limits and sample quantitation limits according to the risk-based concentrations described by EPA (1991) is not provided or referenced. The overall objectives of the analytical plans are to obtain analytical results that satisfy the data quality objectives and to evaluate potential site contamination with regard to the risk-based concentrations. Based on these objectives, analytical methods should be selected to achieve method detection limits and sample quantitation limits below risk-based concentrations (if technically possible).

1. Section 1.0, Page 1-2, first paragraph

Deficiency: How will activities between Operations, D&D, and the ER

programs be coordinated? During the February 27, 1992, 100-N Area Unit Manager Meetings, USDOE informed Ecology that they "wanted relief" from coordinating with Operations and D&D. Ecology stated that this was unacceptable and that this issue should be discussed by the project managers as soon as possible.

Recommendation: Expand the text to explain exactly how this integration and coordination will take place and who will be responsible.

2. Sections 1 and 5

Deficiency: This document does not provide any information concerning actions to be taken after the IRM ROD. USDOE must show a commitment to address all contaminated areas within the 100-NR-1 Operable Unit boundaries not just the IRM sites.

Recommendation: Strengthen Section 1 and Section 5 to describe how interim actions fit into the scheduled work within the entire 100-NR-1 operable unit.

3. Section 1.1, pages WP 1-2 through WP 1-4:

Deficiency: This section draws an invalid distinction between the RFI/CMS process and these interim decision making paths. 1) The three paths are action paths, rather than decision paths. 2) The four paths are all parts of the RFI/CMS process.

Recommendation: Provide a brief explanation of the purpose of the study (i.e., compilation, collection and evaluation of data to make informed decisions on issues such as the need for interim remedial measures and expedited response actions).

Deficiency: This section is entitled, "Purpose and Scope of the Remedial Facility Investigation/Corrective Measures Study", but it does not discuss the purpose of a RFI/CMS study.

Recommendation: Revise the text to state:

The RI/FS process represents the methodology established by the Superfund program for characterizing the nature and extent of risks posed by uncontrolled hazardous waste sites and for evaluating potential remedial options. The objective of the RI/FS process is not the unobtainable goal of removing all uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site.

See, Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, EPA 540 G-89-004, October 1988.

Deficiency: This Section is confusing and vague. A member of the public could not identify the decision points. This process is so complex, a flow chart should be attached.

Recommendation: Include a simple flow chart such as the attached flow chart "Chapter 1 Flow Chart", to help clarify this section.

Deficiency: This Section does not explain the RI/FS process. It does not present the proper sequence of reports, nor explain why the agencies are doing investigations differently at Hanford.

Recommendation: Revise this Section to explain this modified investigation strategy. Describe in chronological order the sequence of investigations, actions, and documents.

Recommendation: Revise the subsections using the following recommendations:

1. The first subsection should be the 100-NR-1 Work Plan.
2. The second subsection should be the High Priority Sites Limited Field Investigations (LFI). Discuss the process for selecting high priority sites. Include a discussion of DOW's and how they are used to implement limited field investigations. Include a discussion of what happens if the LFI's results do not support an IRM to remove contaminants. State that these subunits will be managed as part of the 100-NR-1 RI/FS and ROD.
3. The third subsection should describe the LFI Report. This subsection should state that this report will discuss the results of the LFI's.
4. The fourth subsection should describe the 100 Area Feasibility Study. Discuss the purpose of and content of the 100 Area F.S.
5. The fifth subsection should describe the 100 Area Aggregate Studies. Discuss the reports that make up the 100 Area Aggregate Studies.
6. The sixth subsection should describe the IRM focused feasibility study. A detailed analysis of viable alternatives shall be issued as a report. Discuss the content of the IRM focused feasibility study and the detailed analysis of viable alternatives.

7. The seventh subsection should describe the IRM Proposed Plans. Discuss the contents of the proposed plans. Explain that public comment is required at this stage.
8. The eighth subsection should describe the IRM ROD's. Explain that these ROD's could be separate or combined into one report. Explain that all ROD's are written by the lead regulatory agency. Explain that the ROD will include a responsiveness summary to address public comments received in response to the proposed plan.
9. The ninth subsection should describe the IRM engineering designs (remedial designs). Explain that the remedial designs will be primary documents and that public involvement will not be solicited. Explain that as a part of the IRM implementation, conformational sampling will occur to verify the success of the IRM.
10. The tenth subsection should describe IRM implementation (remedial action). Discuss IRM implementation.
11. The eleventh subsection should describe the 100-NR-1 operable unit remedial investigation. This RI will discuss the success of the IRM's and present the sampling results collected as part of the IRM.
12. The twelfth subsection should describe the 100-NR-1 operable unit feasibility study. Discuss that this FS is a primary report that includes high priority sites as well as low priority sites that may or may not require additional action.
13. The thirteenth subsection should describe the 100-NR-1 operable unit proposed plan. Discuss the purpose of this proposed plan and what information it will contain.
14. The fourteenth subsection should describe the 100-NR-1 operable unit ROD. Discuss the purpose of the 100-NR-1 operable unit ROD.
15. The fifteenth subsection should describe the 100-NR-1 operable unit Remedial Design/Remedial Action. Describe the process for writing this report.
16. The sixteenth subsection should describe the 100 Area NPL Site proposed plan. Describe the 100 Area NPL Proposed Plan.
17. The seventeenth subsection should describe the 100 Area NPL ROD. Discuss the content of the 100 Area ROD and state that

it will not be issued until all the operable unit RODs are complete.

4. Section 1.1, page WP 1-3, last bullet

Deficiency: The text indicates that the interim remedial measure (IRM) path will be selected where existing data are sufficient. However, the IRM path is selected for some facilities by evaluating analogous facilities, sampling analogous facilities, and applying the knowledge gained.

Recommendation: The text should clearly define the IRM path selection criteria.

5. Section 1.1, WP 1-3, first paragraph, first sentence

Comment: The *Hanford Past Practice Investigation Strategy* is mistitled

6. Section 1.2, page WP 1-4, fifth paragraph:

Deficiency: Clear information regarding the specific goals of the project is lacking in this one-sentence general description.

Recommendation: If specific objectives are covered in other sections of this document or in other documents, they should be referenced. A brief discussion of the criteria by which "sufficient" information will be determined should be included, as well as a more complete explanation of why the investigations are being carried out and how the results will be used in the decision-making process.

7. Section 1.3, page WP 1-5

Deficiency: No mention is made of the operable unit-specific description of work (DOW) for sampling and analysis.

Recommendation: Include a discussion of the relationship between the work plan and the DOW for this operable unit. Also incorporate in this section a brief discussion of the type of information that will be included in the DOW for this operating unit (e.g., a detailed description of sampling locations, sampling methods, sampling dates, level of analysis, and level of data validation).

8. Figure 1-3, page WP 1F-3

Deficiency: For the IRM path, the text in the first box contains the

statement "Perform FS Screening." It is not necessary to perform feasibility study screening if risks do not exceed acceptable thresholds.

Recommendation: "Perform FS Screening" should be deleted from the first box. A box containing "Perform FS Screening" should be added to the decision tree before "Can Remedy be Selected?" Also, a brief description for each decision process should be included in an appendix to better aid understanding of the investigation approach.

9. Section 2.1.1, page WP 2-1, fifth paragraph, and table 4-2, sheet 6 of 7

Deficiency: Possible contamination originating from the Hanford Generating Plant or the Bonneville Power Administration substation that may affect the general 100-N Area is not considered in the work plan.

Recommendation: The text should clearly identify who has the responsibility for identification and remediation of contaminants from these facilities. The potential contamination originating from these facilities should be discussed in the work plan as they relate to the 100-N Area.

10. Section 2.1.6.2, WP 2-16, second sentence

Comment: The 120-N-4 site is shown as 1109-N in figure 2.1. Provide consistency between the text and the figure.

11. Section 2.2.4, WP 2-21 and -22

Comment: This section is identical to one in the 100-NR-2 work plan, and properly belongs there. Delete this section.

12. Section 2.2.6.3, WP 2-26

Deficiency: Historical and potential future uses of the area are not mentioned.

Recommendation: Describe historical and potential uses of the area.

13. Section 2.2.6.4.1, WP 2-26

Deficiency: Historical and potential future uses of surface water are not mentioned.

Recommendation: Describe historical and potential uses of surface

water.

14. Section 2.2.6.4.2, WP 2-27

Deficiency: Historical and potential future uses of ground water are not mentioned.

Recommendation: Describe historical and potential uses of ground water.

15. Figure 2-1, WP 2F-1

Deficiency: The figure does not include the 130-N-1 filter backwash pond.

Recommendation: Include the 130-N-1 filter backwash pond.

16. Figure 2-21, WP 2F-21

Deficiency: Contour lines are on the wrong sides of several of the wells. Well N-63 appears incongruously low.

Recommendation: Adjust the contour lines. Explain the water level in well N-63.

17. Figure 2-22, WP 2F-22

Deficiency: Contour lines are on the wrong sides of several of the wells.

Recommendation: Adjust the contour lines.

18. Section 3.1, pages WP 3-1 through WP 3-42;

Deficiency: Pesticide contamination is not mentioned in this section; however, pesticides are listed in Table QAPjP-1 as analytes of interest for this operable unit.

Recommendation: Include a discussion of pesticides as potential contaminants of concern.

19. Section 3.1.1.1, page WP 3-2, second paragraph;

Deficiency: Neutralization of the 116-N-2 wastewater is not described.

Recommendation: Briefly describe the neutralization process. Of primary interest are any compounds that may have been added to the system through the neutralization process, rather than the process itself.

20. Section 3.1.1.1, page WP 3-2, third paragraph, first bullet:

Deficiency: There is no description of the composition of UN-100-N-13.

Recommendation: Describe the 1314-N waste material. Was it primarily decontamination solution from 116-N-2? Was it from 107-N? Was it a mixture of the two? It is difficult to evaluate the proposed investigation without knowing what was released, or thought to be released at this location.

21. Section 3.1.1.2.1, page WP 3-3, first paragraph:

Deficiency: The description of the condenser coolant is insufficient.

Recommendation: A diagram of this facility should be provided. Describe the degree of condenser coolant contamination, if any. If the condenser coolant is regarded as uncontaminated, provide data. This information is necessary to evaluate the proposed investigation at this location.

22. Section 3.1.1.3.2, page WP 3-5, first paragraph:

Deficiency: The description of the 20 cm transfer line to the day tank is insufficient.

Recommendation: Describe whether the transfer line has been checked for leaks besides the 4-26-89 UPR. It is likely that other leaks have occurred in this transfer line. Have periodic checks of the line been made? Why shouldn't the length of the line be checked for leaks?

23. Section 3.1.1.3.2, page WP 3-5, third paragraph, first bullet:

Deficiency: The description of UN-100-N-17 is insufficient.

Recommendation: Show the location of the burn pit on Figure 3-2. Describe any soil sampling that has been done in this area, if any. There is likely to be substantial hydrocarbon contamination in this area.

24. Section 3.1.1.4.1, pages WP 3-5 through WP 3-8:

Deficiency: The description of the 116-N-1 Crib and Trench is insufficient.

Recommendation: Describe what was involved in "routine monitoring" of the crib influent. Describe the nature of releases to the crib. Were they continuous or batch? Describe how the average flow rate to the crib was calculated. Were the releases metered? Describe whether liquid still exists in the trench. This information is important in evaluating: 1) the flow system created from releases to the crib, 2) the degree of accuracy of flow rate calculations, and 3) additional investigations.

25. Section 3.1.1.4.1, page WP 3-6, fourth paragraph:

Deficiency: The description of the table (radionuclide inventory) in this paragraph is insufficient. Data from the *Liquid Effluent Study Final Project Report* (WHC, August 1990) description of more recent N Reactor effluent indicate that many more compounds have been released than are listed here.

Recommendation: Describe the criteria for selection of these radionuclides for inclusion in the table. Cite the most recent data.

26. Section 3.1.1.4.1, table on page WP 3-7

Deficiency: The description of the amounts of compounds disposed in the trench is insufficient. Data from the *Liquid Effluent Study Final Project Report* (WHC, August 1990) description of more recent N Reactor effluent indicate that many more compounds have been released than are described here.

Recommendation: Describe whether the amounts of the solutions described in the table are amounts of solution or amounts of the dangerous waste in the solution. Are these the only known dangerous wastes disposed in the trench?

27. Section 3.1.1.4.2, page WP 3-8

Deficiency: The text in this section indicates that an unplanned release of 50 to 100 gallons of contaminated water occurred on May 11, 1975, and an unknown amount of contaminated water was released on May 7, 1977 at the 1322-N and 1322-NA sample buildings. Conversely, it is reported that a release of 2,000 gallons of radioactive wastewater at 1322-N and a release of 200 gallons of radioactive wastewater at 1322-NA occurred (Table 4.2, page WP 4T-2b and Table 2-1 of a letter report

dated October 15, 1991).

Recommendation: This inconsistency should be addressed and the text changed where appropriate.

28. Section 3.1.1.5.1, page WP 3-8, third paragraph:

Deficiency: The description of transfer lines to tanks is insufficient.

Recommendation: Describe whether piping or other underground transfer routes to, or in, the facility have been checked for leaks. They are a potential source of soil and groundwater contamination.

29. Section 3.1.1.6, pages WP 3-10 through WP 3-11:

Deficiency: The description of the 116-N-3 Crib and Trench is insufficient. Other information is necessary to evaluate the degree of accuracy of the crib and trench description and, consequently, to evaluate the proposed investigation in this area.

Recommendation: Describe what was involved in "routine monitoring" of crib influent. What compounds were analyzed? How frequently were samples collected? Describe the nature of releases to the crib. Were they continuous or batch? Describe how the average monthly flow rate was calculated. Were past releases to the trench metered?

30. Section 3.1.1.6, page WP 3-11, tables (not numbered):

Deficiency: The description of the tables is insufficient. Data from the *Liquid Effluent Study Final Project Report* (WHC, August 1990) description of N Reactor effluent discharged to the 116-N-3 crib and trench indicate that many more compounds have been released than are described here.

Recommendation: Describe the criteria used to select radionuclides and other wastes for inclusion in these tables.

31. Section 3.1.1.8.1, page WP 3-12, third paragraph:

Deficiency: The description of discharge water is insufficient.

Recommendation: Describe what "other sources" of wastewater, besides raw river water, were discharged from the 260-cm outfall line. Were these other sources considered to be contaminated? It is not possible to assess the significance of this unit as a source of contamination without this information. Describe discharge rates prior to 1982, if

available.

32. Section 3.1.1.10.1, page WP 3-15, fourth paragraph:

Deficiency: The description of the water in the spacer storage silos is insufficient.

Recommendation: Describe whether the water has ever been tested for radionuclides, and the results. Two of the silos are open to the soil and may be significant contaminant sources. What is the typical composition of this water?

33. Section 3.1.1.10.4, page WP 3-16, fourth paragraph:

Deficiency: The description of the Corridor 22 release is insufficient.

Recommendation: Describe the nature of the suspected contamination of the spilled water.

34. Section 3.1.1.14.3, page WP 3-19, first paragraph:

Deficiency: The description of radionuclides released from the 107-cm return line is insufficient.

Recommendation: Describe the nature and estimated quantities of the low-level radionuclides that have been released.

35. Section 3.1.1.15.1, page WP 3-19, fourth paragraph:

Comment: The second sentence is unclear.

Recommendation: Add a verb, so that the intent of the sentence can be determined.

36. Section 3.1.1.15.5, page WP 3-22, fifth paragraph:

Deficiency: The description of spent regeneration waste prior to 1977 is insufficient.

Recommendation: Describe how the spent regeneration waste was discharged to the Columbia River. Describe the location of the discharge point.

37. Section 3.1.1.15.5, page WP 3-23, first paragraph:

Deficiency: The description of regeneration waste is insufficient.

Recommendation: Describe cations and anions present in the regeneration waste. Has this waste been analyzed for anything other than pH? This information is necessary to evaluate the relative severity of this source.

38. Section 3.1.1.15.5, page WP 3-23, third paragraph, first bullet:

Deficiency: The description of the June 14, 1986 release is incorrect.

Recommendation: According to Figure 3-2, this release occurred east of the 163-N building, not south. Determine whether the text or the map is correct and modify the other accordingly.

39. Section 3.1.1.17.1, page WP 3-24, fourth paragraph:

Deficiency: The explanation of the radioactive source in the 184-N facility piping is insufficient.

Recommendation: Describe the source or the proposed source of contamination. Is the cause of this contamination possible contaminating other areas?

40. Section 3.1.1.17.3, pages WP 3-25 through WP 3-26:

Deficiency: The description of the area is insufficient.

Recommendation: Describe whether the piping has ever been inspected for leaks, other than those already described. It is likely that the piping has slow leaks along its length and could be acting as a source in other areas.

41. Section 3.1.1.17.3, page WP 3-25, second paragraph, second bullet:

Comment: UN-100-N-22 is not on Figure 3-2.

Recommendation: Locate the area of the leak and show it on the map.

42. Section 3.1.1.20.3, WP 3-28

Deficiency: Use of 120-N-2 prior to 1986 is not described.

Recommendation: Describe use of the impundment from 1977 through 1986.

43. Section 3.1.1.22, page WP 3-30, sixth paragraph:

Deficiency: The location of the N-17 Paint Shop is incorrect.

Recommendation: According to Figure 3-2, the N-17 Paint Shop is located about 300 m east of the N Reactor, not west, as described in the text. Determine which location is correct and modify the other accordingly.

44. Section 3.1.1.24.1, page WP 3-31, second paragraph:

Deficiency: The description of the facility is insufficient.

Recommendation: Describe why the five existing sewer systems were considered potentially unsafe. Should they be considered as source areas?

45. Section 3.1.1.25.5, page WP 3-32, sixth paragraph:

Deficiency: The information on the length of use of the facility is contradictory.

Recommendation: Determine whether the HGP Transformer yard is still in use, as indicated by the text, or was discontinued in 1988, as indicated by Table 3-1. Correct the text or the table.

46. Section 3.1.2.1, page WP 3-33, fifth paragraph:

Comment: The descriptions of soil metals analysis results does not distinguish between total metals and extraction procedure metals.

Recommendation: Indicate that Table 3-6 tabulates total metals results, and that Table 3-9 tabulates total metal results unless noted as EPA extraction procedure results.

47. Section 3.1.2.1, begins page WP 3-33

Deficiency: Soil samples used to determine background concentrations for contaminants in the 100-N Area soils were collected onsite and near source areas. Although the first paragraph of the section claims that soils near waste units may be used to establish background, the fourth paragraph indicates that such samples would be of limited use. For example, the presence of volatile and semivolatile compounds, which are typically at or below detection limits in most undisturbed areas in

these soils, suggests that these data may not represent true site background conditions.

Recommendation: Compare the analytical results to regional and Hanford-wide soil samples to ensure they represent site conditions. Remove indications that local conditions may be used to establish background (particularly, the second and third sentences of the first paragraph, and the third sentence of the last paragraph). Fully explain the Hoover background study, particularly its relationship to the other data mentioned in this section. Place site-specific aspects of this section in section 3.1.1.

48. Section 3.1.2.4, begins page 3-36

Deficiency: The explanation of absorption/desorption is incomplete.

Recommendation: Explain the following. The "retardation" capacities of soils are limited. At some point ion exchange sites will become saturated and the solution will reach equilibrium with the soil so that precipitation of contaminants no longer occurs. The "retardation," or relatively-slower migration of contaminants as compared to groundwater flow rates, becomes insignificant. Also, if the source of contaminated solution is removed, these contaminants will probably begin to partition back into solution (in this case, groundwater). They are not necessarily permanently retained in the soil column.

49. Section 3.2.1.2, pages WP 3-44 through WP 3-45:

Deficiency: Many regulations whose administration is by the State of Washington are missing from the list of regulations.

Recommendation: Include the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC) and the Washington State Drinking Water Regulations (Chapter 246-290 WAC) in the list of potential chemical-specific requirements of the State of Washington. Also, Water Quality Standards for Ground Waters of the State of Washington (Chapter 173-200 WAC) should be cited.

50. Section 3.3, WP 3-47, et seq.

Deficiency: Refer to the letter from Ecology to USDOE, dated February 27, 1992, regarding section 3.3.

Recommendation: The following version of section 3.3, partially based on a marked up 100-BC-1 preliminary draft, would be fundamentally satisfactory to Ecology.

The purpose of this section is to develop a conceptual site model. Information on the waste sources, pathways, and receptors at a site is used to develop a conceptual understanding of the site to evaluate potential risks to human health and the environment. This effort, in addition to assisting in identifying locations where LFI, ERAs, and IRMs are necessary, will also assist in the identification of potential remedial technologies. This assessment is based on currently available information regarding the contaminant sources, locations, and quantities described in section 3.1, and unit. The conceptual model is developed in Section 3.3.1 and identifies potential contaminant sources, release and transport mechanisms, exposure routes, and receptors. The objectives of RFI/CMS. Section 3.3.2 explains the current selection of sites for ERAs. The conclusions in this section are tentative and will be subject to refinement based on the results of the RFI.

Due to the qualitative methodology and limited data upon which this assessment is based, neither the structure nor conclusions of section 3.3 are intended to limit the focus of subsequent risk assessments. A quantitative risk assessment will be conducted as described in section 5.1.11.

3.3.1

Based . . . developed. This conceptual model of exposure pathways is not intended to be an exhaustive analysis. However, it does serve as the basis for identifying sites for LFIIs and sites where ERAs and IRMs may be implemented. The model . . . work plan. . . .

3.3.1.1 through 3.3.1.6

• • •

3.3.2 and 3.3.3

(Delete these sections and replace them with the following redraft of section 3.3.4, renumbered as 3.3.2.)

3.3.2 (former 3.3.4) ~~Imminent~~ Assessment of Need for ERA

During work plan rescoping, information presented in the previous draft of this work plan was used as the basis for identifying high priority sites for conducting LFI's, sites or routes of exposure for conducting IRMs, and for determining that

ERAs are not currently warranted. The conceptual exposure pathway model provides information which was used as one basis for making these rescoping decisions. In deciding whether an ERA was appropriate, both technical engineering judgement, and an evaluation of potential threat to human health and the environment were considered. The decision for an ERA was made, based on the immediacy and magnitude of the potential threat to human health and the environment, the nature of appropriate corrective action, and the implications of deferring the corrective action until the RFI/CMS study is completed. The conclusions in this section are tentative, and will be subject to refinement based on the results of the RI.

~~This discussion . . . (EPA 1988d).~~ During work plan rescoping, the three parties did not identify any situations at the 100-NR-1 operable unit that warranted response through an ERA.

3.3.2.1 (former 3.3.4.1) Human Health.

Based . . . does not appear to warrant . . . health that this time to pose an immediate danger to the public. However, . . . conducted. Although several dangerous wastes have been disposed of and detected in the 100-NR-1 environment, the conceptual exposure pathway model indicates that onsite workers are currently the more significant potential human receptor population. Essentially all of the contamination is buried beneath the ground surface, and onsite controls are sufficient to prevent contact with contaminants. Releases from the site through the N-Springs will be addressed as a high priority IRM in the 100-NR-2 operable unit. Because the 100-NR-1 operable unit does not at this time present any other immediate threat to the public, no ERAs are planned at this time. However as data is collected and evaluated for this RFI, the need for an ERA will be reassessed.

3.3.2.2 (former 3.3.4.2) The Environment

Based on information provided in section 3.1, it does not appear that . . . at this time at this time that an ERA is warranted to address contaminants associated with the 100-NR-1 operable unit.

3.3.3 (former 3.3.5) Summary

Preliminary . . . facilities. The current The predominant . . . humans offsite. A preliminary . . . radionuclides. Based on current knowledge, it is believed that a finding of imminent and substantial endangerment to human health or the environment is not

~~warranted, nor are any ERAs~~no ERAs are warranted at this time.
Outside . . . section.

51. Section 3.3.1

Deficiency: Section 4.1.1.1, the second paragraph of page WP 4-3, indicates that a conceptual model is presented in chapter 3. However, section 3.3.1 is not sufficient as a conceptual model of the extent of contamination.

Recommendation: Provide a summary section in section 3.3 that concisely provides a current comprehensive conceptual model of contamination in the major media (air, water, soil). The information contained in Section 3.1 needs to be clearly summarized with a unifying description of site contamination, including areas that have already received substantial investigation and have known data gaps. There is no discussion of the vertical extent of contamination. Is anything known about whether contamination has extended below the water table aquifer? Figures showing the types of contamination in the different areas of the site should be included. It is difficult to evaluate the technical defensibility of the proposed field investigations without this information.

52. Section 3.3.1.2, WP 3-48, second paragraph of section

Deficiency: The paragraph does not mention that contaminated groundwater may enter the River through the hyporheic zone, without discharging into a surface spring.

Recommendation: Explain that contaminated groundwater may enter the River through the hyporheic zone.

53. Section 3.3.1.3, page WP 3-48, eighth paragraph:

Deficiency: The text indicates that contaminants can reach the river via groundwater. Two other ways of transport are via air transport of contaminated soils and overland runoff from contaminated areas. In addition, releases of volatile compounds will be transported via the atmosphere.

Recommendation: Air transport of contaminated soils and overland runoff from contaminated areas should be included as an additional means of contaminants reaching the river. In addition, releases of volatile compounds to the atmosphere should be included as a transport mechanism.

54. Sections 3.4.2 and 3.4.3, WP 3-56 through -57

- Deficiency: The discussion on waste treatment is too general. The text does not clearly identify the various process options for each type of waste site (i.e., solid wastes, soils, river sediments, groundwater) as stated in Section 5.2.

Recommendation: The preliminary waste treatment technologies should be clearly identified for solid waste and soils and should be presented in this work plan. Similarly, the specific technological process options for sediments and groundwater should be presented in the work plan for the 100-NR-2 operable unit. Also, the purpose of each technological process option in terms of contaminant reduction should be discussed briefly.

55. Section 3.4.4, page WP 3-58, second bullet

Deficiency: The text indicates that macroengineering will be conducted as a final alternative and not as an IRM. However, macroengineering is shown as an interim remedial technology in Figure 3, page WP 3-15. It is not clear whether macroengineering removal action will be used only as a final remedial action or for both interim and final actions. Also, in the last sentence (and in Section 3.4.2, page 3-56, third paragraph) the following statement is vague and uninformative: "Macroengineering removal alternatives may be effective in meeting remedial action objectives for residential or agricultural land uses, but may be inconsistent with wildlife and recreational land use."

Recommendation: The statement on the use of macroengineering removal alternatives for remedial action should be consistent in the text and in the figure. Since macroengineering removal is selected as one of the final remedial actions to meet the preliminary remedial action objectives, the manner in which macroengineering removal may be inconsistent with the overall objectives should be explained.

56. Section 3.4.4, pages WP 3-57 through WP 3-59:

Deficiency: The text does not include the prioritization of different corrective measure alternatives.

Recommendation: MTCA gives preference to alternatives that detoxify contaminants or remove them from a site rather than leave them onsite. Prioritization of corrective measure alternatives based upon MTCA should be included in the strategy for evaluating those measures.

57. Figure 3-2, page WP 3F-2:

Comment: 116-N-4 is not labeled on this figure.

Recommendation: Label 116-N-4 on this figure.

58. Table 3-11, WP 3T-11

Comment: "N6-95" is included in the list of radionuclides detected in 116-N-1 trench samples. We are unfamiliar with such a radionuclide. Is this a typo?

59. Table 3-13, page WP 3T-13:

Deficiency: This table only lists hydrophilic organics found in trench sediments. Also, the labeling of this table is unclear.

Recommendation: Provide a complete list of organic analytes, their detection limits, and concentrations. Clearly label the table as to which trench the samples were from.

60. Table 3-28, page WP 3T-28:

Deficiency: This table appears to be incomplete based on comparison with sites included in the *Liquid Effluent Study Final Project Report* (WHC, August 1990).

Recommendation: Include information from the *Liquid Effluent Study Final Project Report* (WHC, August 1990). In the work plan, the description of this table in Section 3.3.2.1 (page WP 3-50, third paragraph) says "Table 3-28 presents all the known non-radioactive waste constituents that were disposed of at the 100-NR-1 operable unit." A cursory comparison of this table to data in the *Liquid Effluent report* indicates that the following non-radioactive hazardous waste constituents were disposed of in at least one site within the 100-NR-1 operable unit: benzoic acid, 1-butanol, 2-butanone, butylated hydroxy toluene, MIBK (2-hexanone), toluene, trichloromethane, unknown hydrocarbon, unknown oxygenated PAH, unknown phthalate. The disposal of many of these compounds in this operable unit is not noted anywhere in this work plan, yet the information was readily available from the N Reactor Effluent Stream sampling data. This omission is misleading and gives the incorrect impression that very few, if any, organic compounds were disposed in this area. Many of these compounds are not very volatile and would be expected to persist in the soil column and possible reach the saturated groundwater system. This omission could result in a serious underestimate of the severity of contamination in this operable unit, particularly if any other easily available

information has been omitted.

61. Table 3-29, page WP 3T-29:

Deficiency: This table appears to be incomplete based on comparison with sites included in the *Liquid Effluent Study Final Project Report* (WHC, August 1990).

Recommendation: Include information from the *Liquid Effluent Study Final Project Report* (WHC, August 1990). A cursory comparison of this table to data in the Liquid Effluent report indicates that the following radionuclides were disposed of in at least one site within the 100-NR-1 operable unit: Curium-242, Curium-244, and Lead-210. The half-lives of these radionuclides are all greater than 100 days, and therefore, should be included in this table. The omission of such readily available information could result in an underestimate of radionuclide contamination in this operable unit.

62. Table 3-30, page WP 3T-30:

Deficiency: This list of contaminants of interest is incomplete.

Recommendation: Include information from the *Liquid Effluent Study Final Project Report* (WHC, August 1990). As noted previously, several compounds that were disposed of in significant quantities at this site do not appear on previous tables (3-28 and 3-29). These compounds are hazardous and are probably contaminants of interest in the 100-NR-1 operable unit.

63. Section 4.0, page WP 4-1

Comment: No discussion on the nature and extent of contamination at N-Springs is provided. A summary should be included.

64. Section 4.0, Page 4-1, second paragraph:

Deficiency: The data quality needed for the qualitative risk assessment by itself may be less than that required for a baseline risk assessment (Level II versus Level IV, for example). However, because the baseline risk assessment can use validated data from the qualitative risk assessment, that data should be of high quality at least Level III, according to EPA guidance on data quality objectives.

Recommendation: The essential difference between the qualitative risk assessment and the baseline risk assessment should be defined so that their data quality objectives are complementary.

65. Section 4.1, page WP 4-2, first paragraph, second bullet.

Deficiency: In the discussion of the rationale for the technical approach, the text indicates that data produced by the RFI field program must support development and evaluation of interim remedial measures (IRMs). The data should also support evaluation of final corrective measures to the extent practical, to minimize the potential for duplication of data collection efforts.

Recommendation: A preliminary list of final corrective measures should be discussed in the rationale for the technical approach.

66. Section 4.1, page WP 4-2, second paragraph:

Deficiency: The wording of the second rationale for the technical approach is ambiguous.

Recommendation: Explain the phrases "streamlined approach with a bias for action" and "observational approach." These phrases are jargon and are not sufficient as a concept for the technical approach. The phrase "observational approach," in particular, is used throughout this section with no real definition of what it means.

67. Section 4.1.1.2, Page 4-4, third paragraph

Deficiency: The text states that "a generalized approach for investigations to be conducted at these sites will be described." This paragraph implies this description will be in the Scopes of Work (SOW) for field sampling activities. This is incorrect. A generalized approach for investigations should be in this work plan.

Recommendation: Revise the text to include a generalized approach for the listed site.

68. Section 4.1.2.1, WP 4-6, sixth bullet

Deficiency: The data needed for "an understanding of the relationship between water-table fluctuations and release and transport of contaminants from the lower vadose zone and capillary fringe to ground water" is described as being derived from 100 Area aggregate investigations. The collection of this data is not explicitly described in milestone M-30, and we know of no other 100 Area aggregate investigation that would address this issue.

Recommendation: Data to evaluate the release of contaminants to ground water as a result of fluctuating water levels falls within the scope of

the 100-NR-2 operable unit RI/FS and should be noted as such. The description of how these data will be gathered should be included in section 5.1 and section 6.

69. Section 4.1.2.2, Page 4-6

Deficiency: It is noted that determining the nature and vertical extent of contamination in the vadose zone should be sufficient for conducting a qualitative assessment at individual waste sites. This information may indicate what contaminants are present, but provides little guidance on potential future exposures. At a minimum, at least semiquantitative information on infiltration rates, soil hydraulic characteristics, and contaminant transport characteristics will be required for a qualitative risk assessment. This is why a 100-Area-wide physical properties strategy was developed.

Recommendation: Include a discussion about contaminant transport characteristics that will be necessary for a qualitative risk assessment development.

70. Section 4.1.2.2, Page 4-6:

Comment: The text does not describe what role, if any, the low priority sites will be in the qualitative risk assessment. The text would be more complete if the section discussed the quantity and quality of data required to perform a qualitative risk assessment and it's relationship to LFI's, IRM's and RFI/CMS studies.

71. Section 4.1.2.2, WP 4-6

Deficiency: It is stated here that "IRM's are initially anticipated at the high priority waste sources and for environmental media found to exceed threshold concentrations." Because this is a source-operable unit and ARAR's for soils are very limited, we do not understand what is meant by "threshold concentrations."

Recommendation: Explain what exactly constitutes a threshold concentration and how will it be determined?

72. Section 4.1.2.3, page WP 4-7, first bullet:

Deficiency: The nature and vertical extent of contamination are identified as the data needed for developing and evaluating IRMs and developing the IRM record of decision. Until an IRM is selected and agreed to by all parties involved, the lateral or areal extent of contamination should also be included as a data need.

Recommendation: Include the lateral or areal extent of contamination as a data need.

73. Section 4.1.2.6, Page 4-9, second paragraph:

Deficiency: If possible the RFI should collect design level information like moisture content, Ph, etc. This is desirable in order to better understand potential final management and disposal options of IRM soils.

Recommendation: Expand the text to discuss the relatively inexpensive physical property analysis, and the need to do so.

74. Section 4.2.1.1, Page 4-10:

Deficiency: Included in the discussion of the *Hanford Past Practice Investigation Strategy* should be contingencies that discuss the fate of low priority waste sites that do not follow the LFI/IRM path. Specifically how do sites reach the final remedy selection path as shown on Figure 1-3 of this work plan.

Recommendation: Expand this section to include options for environmental remediation/management of low priority waste sites that follow the final remedy selection path..

75. Section 4.2.1.1, Page 4-10, first paragraph:

Comment: The term "streamlined" requires clarification when used in defining the Hanford Site RI/FS process. Please clarify what is meant by the "streamlined" Hanford Site RI/FS process.

76. Section 4.2.1.1, page WP 4-10

Deficiency: The text indicates that the IRM path will be selected where existing data are sufficient. However, the IRM path is selected for some facilities by evaluating analogous facilities through sampling and applying the knowledge gained.

Recommendation: The text should clearly define the IRM path selection criteria.

77. Section 4.2.1.2, Page 4-11, first paragraph

Deficiency: This paragraph discusses the completion of shutdown within a time frame compatible with the new past practice strategy. What is the time frame? If shutdown is incorporated into the program, how will

it be done?

Recommendation: Expand the text to define how shutdown activities will be incorporated into the program in adequate detail.

78. Section 4.2.1.2.1, page WP 4-11

Deficiency: The site designation 105-N refers to the reactor spent-fuel storage basin in this section. In Table 4-2, page WP 4T-2b, 105-N refers to the lift station underground storage tank as well as to the reactor spent-fuel storage basin.

Recommendation: This discrepancy should be resolved.

79. Section 4.2.1.2.4, page WP 4-13, first paragraph

Deficiency: The text indicates that one vadose zone boring will be completed at the 116-N-2 radioactive chemical waste treatment and storage facility. But the schedule for vadose investigation correctly shows that two boreholes are planned at 116-N-2 (Figure 6-1).

Recommendation: This discrepancy should be corrected.

80. Section 4.2.1.2.4, page WP 4-13, second paragraph

Deficiency: A soil gas survey is planned at the 166-N tank farm; however, there is no schedule for this field activity under Task 2, Source Investigation in Figure 6-1, Operable Unit Schedule.

Recommendation: A schedule for a soil gas survey at the 166-N tank farm should be included in Figure 6-1.

81. Section 4.2.1.2.5, page WP 4-13, first paragraph

Deficiency: The text refers to Figure 4-5 for the investigation of low priority sites. The decision process in Figure 4-5 starts with a review of limited field investigation (LFI) data from analogous facilities.

Recommendation: The analogous facilities or the operable unit within which the analogous facilities are located should be specified to verify whether data exist, or if a LFI is planned to collect data for those analogous facilities.

82. Section 4.2.1.2.5, page WP 4-14, last paragraph

Deficiency: The text contains a discussion of the investigation approach for only two lowest priority sites. The investigation approach for the remaining lowest priority or miscellaneous waste sites listed in Table 4-2 is not provided.

Recommendation: A statement describing the field investigations proposed for the lowest priority or miscellaneous waste sites should be included.

83. Section 4.2.2, Page 4-14

Comment: This section states that one bore hole will be located at the area most likely to represent the "worst case" conditions. No explanation is given as to how these conditions were determined.

Recommendation: Describe in the text how worst case conditions were identified.

84. Section 4.2.2, page WP 4-14 to -15

Recommendation: Provide a complete list of the CERCLA Target Compound List and Target Analyte List constituents.

85. Section 4.2.2.1, Page 4-14, second paragraph of section

Deficiency: In some cases sampling at five-foot intervals could miss lenses of fined grain material. Contamination routinely resides in these fine grain areas.

Recommendation: The text must state that samples will be taken at five foot intervals or lithologic changes.

86. Section 4.2.2.1, page WP 4-14, fifth paragraph:

Deficiency: Specific detection limits, quantification limits, and precision and accuracy are not defined in this section.

Recommendation: Reference should be made to the QAPjP, the operable unit-specific DOW, or other appropriate document regarding these items.

87. Table 4-1, WP 4T-1a

Deficiency: The vadose-zone data needs of saturated and unsaturated hydraulic conductivity, moisture content, and physical properties are

all noted to be supplied by Hanford site-wide studies. These vadose-zone properties are site specific in nature, and we know of no Hanford-wide investigations to provide such data. As described elsewhere in the work plan, these data will be supplied by source and aggregate-area investigations and should be so noted here.

Recommendation:

In Table 4-1, note that saturated and unsaturated hydraulic conductivity data will be supplied by the 100-Area physical properties study described in Section 4.2.2.1 by inserting an A, and note that moisture content and physical properties data will be supplied by source investigation and by the aggregate area investigations by inserting an S and a G.

In addition to the vadose-zone data presented here, the moisture retention relationship (soil characteristic curves of moisture content versus matric potential) will also be a data need. This information should be supplied from the 100 Aggregate Area Study of soil physical properties described in Attachment 1 of this work plan.

88. Table 4-1, page WP 4T-1b:

Deficiency: The table indicates that infiltration values will be based upon actual site surface conditions. There is no discussion of how this will be done in Sections 5.1.5.2 or 5.1.5.3.

Recommendation: The measures that will be used to develop infiltration values should be described in Section 5.1.5.2 or Section 5.1.5.3, as appropriate. Presumably, this development will include onsite infiltration measurements. If this is not the case, the rationale for developing the values should include criteria for correlating offsite data to site conditions.

89. Table 4-2, Page 4T-2a:

Deficiency: Vadose zone borings are to be installed to a depth of 5 feet below detectable contamination as determined by field screening. The work plan does not describe how detectable contamination will be defined.

Recommendation: Describe the criteria by which detectable contamination will be defined.

90. Table 4-2, WP 4T-2A

Deficiency: The schedule in Figure 6-1 lists 1 bore hole to be

installed at 166-N and 2 bore holes to be installed at 116-N-2. However, Table 4-2 lists only 1 bore hole at 116-N-2 and none at 166-N.

Recommendation: Review Table 4-2 and list bore holes to be drilled at 166-N and 116-N-2 as shown in Figure 6-1.

91. Table 4-2, pages WP 4T-2b, WP 4T-2d, and WP 4T-2f

Deficiency:/Recommendation:

The 166-N tank farm and the diesel collection trench are considered medium priority sites for investigations (Section 4.2.1.2.4, and Table 2-1 in the letter report of October 15, 1991). These waste sites are not included in this table and should be.

The table indicates that investigations are not planned for the miscellaneous low priority waste sites listed. The rationale for not investigating these facilities is not discussed elsewhere, but should be provided.

Also, it is not clear whether or not subtask 2a - Source Data Compilation and Review, and subtask 2c-1 - Site Walkover, will be conducted at these facilities. These subtasks are planned for the entire operable unit facilities (Section 5.1.2). This discrepancy should be addressed.

The text in Section 4.2.1.2.5 indicates that test pits are proposed across the drain fields of inactive septic and sewer systems. However, the planned test pit excavations for these systems are not included in Table 4-2 under Investigation Approach. This discrepancy should be addressed.

92. Section 5.1, page WP 5-1, fifth paragraph:

Deficiency: There is no reference to a DOW or what a DOW is and how it works in the overall scheme of the operable unit characterization.

Recommendation: Discuss DOWs and how they are reviewed and implemented within the scope of the 100-N Area.

93. Section 5.1.2.2, page WP 5-5, fourth paragraph:

Deficiency: The geodetic/topographic survey and base map development are described in this section. The text does not indicate how the data from these surveys will be compiled into a map.

Recommendation: Specify how these base maps will generally be compiled.

For a project of this size, all base map information should be automated using either a CAD or GIS computer mapping system.

94. Section 5.1.2, page WP 5-4, second paragraph

Deficiency: The text states that source investigation subtasks will be conducted at each high priority facility. But, concurrent characterization during remediation and remediation following decommissioning are planned at high priority sites (Table 4-2). It is not clear whether all of the proposed source investigation subtasks will be conducted prior to site remediation or if some will be deferred to site remediation following IRM pathway selection at high priority facilities.

Recommendation: This should be clarified.

95. Section 5.1.2.1, page WP 5-4

Deficiency: The text in this section does not state clearly enough whether subtask 2a - Source Data Compilation and Review will be conducted at all of the waste sites within the operable unit or for only the facilities listed on Table 2-1.

Recommendation: This section should clearly state that the source data compilation will provide additional information for facilities listed on Table 2-1 and the 100-N Area sources listed on Table 3-1.

96. Section 5.1.2.3.1, page WP 5-6

Deficiency: The text states first that a site walkover will be conducted at low priority facilities (emphasis added) during the LFI. It then states that the entire operable unit will be included in the walkover, contradicting the first statement.

Recommendation: The text should clearly state that the site walkover will include the entire operable unit, including the source areas listed on Table 3-1.

97. Section 5.1.2.3.2, page WP 5-6, first paragraph

Deficiency: The text states that surface radiation survey data will be used to identify areas of surface and, potentially subsurface radioactive contamination (emphasis added).

Recommendation: The text should explain how the surface radiation survey data will be used to identify subsurface radioactive

contamination.

98. Section 5.1.2.3.2, page WP 5-7, last paragraph

Deficiency: The text in the first sentence should clearly state whether selected waste disposal sites or all of the areas showing radiation levels statistically above background results will be further investigated as shown in Task 5 - Vadose Zone Investigation.

Recommendation: The text should also state that additional surface soil samples may be taken based on the results of radiation surveys. The last sentence should include "and submitted for regulatory agency approval" at the end.

99. Section 5.1.2.3.2, page WP 5-6, fifth paragraph

Deficiency: This section discusses the surface radiation survey. The rationale, schedule, and description of which areas will receive surface radiation surveys is unclear. For instance, will the waste disposal sites located outside of the main fenced portion of the facility be surveyed before, during, or after reactor shutdown? Where is the main fenced portion of the site? Routine radiation surveys for health and safety monitoring are probably being performed inside the fenced area. Why not survey the areas not covered by the routine surveys? Why will reactor shutdown activities interfere with the site wide radiation survey?

Recommendation: Provide, or reference, a figure showing the location of the "main fenced portion of the facility." Is this portion of the facility already being monitored? If this is true, then what areas are being monitored? It is not possible to evaluate the validity of the proposed surface radiation survey without a clear description of the area to be surveyed.

100. Section 5.1.2.3.3, page WP 5-7, fourth paragraph:

Deficiency: This section states that ground penetrating radar will be used to determine the location of septic tanks and septic system drainfields.

Recommendation: List all the areas where GPR will definitely be used, and discuss how you will decide where to use it.

101. Section 5.1.2.3.4, page WP 5-7 to -8

Deficiency: The descriptions of source sampling activities are

incomplete.

Recommendation:

a) First paragraph: Explain why only these three sources will be sampled. Limitation of the source sampling to these locations, in light of the many unplanned releases that have occurred and have not been fully investigated, appears inadequate. Describe what criteria will be used to select additional surface soil sampling sites.

b) Second paragraphs: Explain what in the second sentence will be based on field screening (locations or number of samples). Collect soil samples deeper than 1.5 m if the base of the backfill has not yet been reached. Do not collect samples from the uncontaminated backfill.

c) Third and fourth paragraphs: Explain how samples at UN-100-N-5, UN-100-N-13, and UN-100-N-26 will be collected. To what depth will the samples be collected?

102. Section 5.1.2.3.5, page WP 5-8, third paragraph:

Deficiency: The description of the soil gas survey is insufficient.

Recommendation: Include a map of the proposed gas sampling locations, a list of the constituents to be analyzed, and a description of the sampling system and equipment to be used. Describe what further action will occur if soil gas sampling indicates an area is contaminated.

103. Section 5.1.5, page WP 5-9, first paragraph:

Deficiency: This section discusses defining the nature and vertical extent of contamination in the vadose zone, but does not discuss the method of defining the lateral or areal extent of contamination. Since the work plan does not identify an interim remedial measure, the lateral extent of contamination could be important in determining the final remedial action.

Recommendation: The text should also address the means of determining the lateral extent of contamination.

104. Section 5.1.5.2, pages WP 5-10 through WP 5-11:

Deficiency: The description of borehole sampling and logging is incomplete.

Recommendation:

a) Provide a figure showing the proposed borehole locations. This figure could be qualified to indicate that field conditions may necessitate adjusting the locations of boreholes in order to obtain samples representative of "worst-case" contamination. This type of figure would reduce the ambiguity of some of the listed locations (eg. on which side of the 120-N-2 surface impoundment would drilling occur?). Specify how many borings would be drilled at each facility.

b) Explain why only these facilities were chosen for investigation. There are many more areas that have received significant releases that have not been addressed by this section. The current work plan leaves many data gaps. If there is no reason for the exclusion of certain source areas, include them in the investigation.

c) There are no provisions for sampling areas of visible contamination that do not occur within the preset sampling intervals. Provide a mechanism for this to occur, since many of the potential contaminants will not be detectable with field screening instruments.

105. Section 5.1.5.2, page WP 5-11, first paragraph:

Deficiency: The vadose zone borings are proposed to be installed to a depth of 5 feet below detectable contamination as determined by field screening. The work plan does not describe how "detectable contamination" will be defined.

Recommendation: Describe the criteria by which "detectable contamination" will be defined and what field screening methods will be used. If field screening techniques are inadequate to address certain contaminants of concern, this sampling approach may be unacceptable.

106. Section 5.1.5.2, page WP 5-11, first paragraph

Deficiency: The specific field screening technique and the equipment to be used for radiological and chemical analyses in the field should be provided.

Recommendation: A brief summary of the procedure for each analysis should also be included.

107. Section 5.1.5.2, WP 5-11 and TABLE 4-2

Deficiency: The vadose-zone borings are proposed to be installed to a depth of 5 ft below detectable contamination as determined by field screening. The work plan does not describe how "detectable

contamination" will be defined.

Recommendation: Describe the criteria by which "detectable contamination" will be defined.

108. Section 5.1.5.4, page WP 5-12

Deficiency:/Recommendation:

"Soil Sample Analysis and Data Validation" should be substituted for "Soil Sample Analysis" as the title of Subtask 5d.

In the first sentence, the phrase "priority waste sites" is ambiguous; it is not clear whether priority waste sites means high, medium, or low priority waste sites. This should be clarified.

109. Section 5.1.5.6, page WP 5-13

Deficiency: This section should address the data evaluation procedures specific to the Task 5 -Vadose Zone Investigation. The emphasis of the evaluation should be to summarize the results of the analyses in an organized and logical manner for each medium and determine whether additional data are required. The typical activities for vadose zone data evaluation should be similar to the steps discussed in Section 5.1.2.5 for source data evaluation.

Recommendation: The text in this section should be accordingly revised.

110. Section 5.1.5.3, pages WP 5-11 through WP 5-12;

Deficiency: This section does not explain which samples, if any, will be sent to the laboratory for further analysis.

Recommendation: Clearly describe how certain test pit samples will be analyzed. State the criteria for sending test pit samples for further analysis, and what minimum number of samples will be analyzed further if field methods do not indicate contamination.

111. Section 5.1.5.4, page WP 5-12, third paragraph;

Deficiency: The description of sample analysis is incomplete.

Recommendation: Again, a complete listing of the CERCLA TCL and TAL constituents should be provided in this report.

112. Section 5.1.7, page WP 5-13, fourth paragraph:

Deficiency: The potential for the spread of contamination by particulate matter will not be confined only to those times when there are invasive activities on the site. Blowing of dust by wind at the Hanford Site is a normal occurrence.

Recommendation: Expand the text to include a discussion of the criteria that will trigger the implementation of additional air investigations regarding the spread of surface soil contamination by way of entrained particulate matter (e.g., exposure limits to heavy metals such as lead).

113. Section 5.1.10, page WP 5-15, sixth paragraph:

Deficiency: This section discusses the integration, evaluation, and presentation of data generated during the LFI and IRM. There is no description of how this will be accomplished.

Recommendation: The results of each of the individual tasks (1-9) should be presented in a report.

114. Section 5.1.10, page 5-15

Recommendation: This section should include the following additional activities (EPA 1988):

- ▶ Summarize the quantities and concentrations of specific chemicals at the site and the background levels surrounding the site.
- ▶ Conduct environmental fate and transport modeling and evaluation.
- ▶ Describe the potential transport mechanism and the expected fate of the contaminant in the environment.

The following text should be added to the last sentence: "determine whether an IRM should be conducted, and develop remedial action objectives and remediation goals."

NOTE: The following four comments attempt to provide continuity and timely responses between the 100-HR-1 and 100-NR-1 work plans.

115. Section 5.1.11, HR-1 redline

Comment: Ecology accepts the following revisions as they appear in the redlined text of the HR-1 work plan:

- ▶ The second paragraph of 5.1.11.
- ▶ The first paragraph of 5.1.11.2.
- ▶ The first paragraph of 5.1.11.4.

Ecology does not accept, in whole or in part, the rest.

116. Section 5.1.11. HR-1 redline

Deficiency: The environmental evaluation is discussed in parallel with the human health evaluation, under the same four subtask headings. This is not acceptable, as noted in our last set of work plan comments.

Recommendation: Conduct the environmental evaluation as a separate subtask under the risk assessment task. Use the EPA guidance, including the "framework" document and the outline prepared by EPA and Ecology in the risk assessment working group.

117. Section 5.1.11.1, .2, and .3, HR-1 redline

Deficiency: New and undocumented terms and concepts are introduced into the environmental evaluation. These include habitat and species of potential concern in the third paragraph of 5.1.11.1, the concept in the fourth paragraph of 5.1.11.2, and the last paragraph of 5.1.11.3. Endpoints is the concept that applies. Endpoints of concern is redundant, since endpoints are selected with significance as a criteria.

Recommendation: Follow existing and developing guidance in an environmental evaluation subtask.

118. Section 5.1.11.1, HR-1 redline

Deficiency: The title of the subtask 11a varies from EPA guidance. This variance was pointed out in Ecology's comments on the work plans and the draft Hanford risk assessment methodology. An exchange of memos with Golder Associates did not reach an alternate resolution.

Recommendation: Entitle subtask 11a as "Data Evaluation."

119. Section 5.2

Deficiency: This section should include all the steps that lead to the decisions. Each step results in a report, except that a detailed analysis of viable alternatives may be integrated with the report on the corresponding feasibility study. In CERCLA terms, those steps are:

- 1) IRM focused feasibility studies

- 2) IRM detailed analyses of viable alternatives
- 3) IRM proposed plans
- 4) IRM RODs
- 5) Operable unit remedial investigation report
- 6) Operable unit feasibility study
- 7) Operable unit detailed analyses of viable alternatives
- 8) Operable unit proposed plan
- 9) Operable unit ROD

Recommendation: Include a discussion of each of the steps listed above.

120. Section 5.2

Deficiency: This section does not identify all of the reports that must be addressed in the 100-NR-1 focused feasibility studies.

Recommendation: Add bullets and discuss:

- 1) Soil Disposal Options
- 2) Risk Assessment Methodology
- 3) Hanford Background Report
- 4) River Impact Study
- 5) LFI Reports
- 6) Shoreline Study Reports
- 7) Ecological Study Report
- 8) Cultural Resource Study Report
- 9) Further clarification of ARARs
- 10) Summary of the 100 Area FS including treatability tests.

121. Section 5.2, page WP 5-18 through -19

Deficiency: There are editorial errors and ambiguities in this section.

Recommendation:

The first sentence of the first paragraph is not complete and should be clarified.

In the second paragraph, either "corrective measure study (CMS)" or "feasibility study (FS)" should be used consistently.

Phase I and phase II feasibility studies should be defined or a section should be referenced for definition.

Deficiency: The text in the third sentence states that "the 100-NR-1 section of the FS will address solid waste and soils." No discussion is provided on the investigation of solid wastes, other than soils, in the 100-NR-1 operable unit work plan.

Recommendation: This discrepancy should be addressed.

122. Section 5.2.2, page WP 5-19

Recommendation:

Solid wastes and sediments are not included in item 1 as specified in Section 5.2, but should be.

The rationale for identifying corrective action requirements (CARs) pertinent only to the removal of wastes is not provided, but should be. The text in item 2 should reflect all action-specific CARs, not removal action only.

"Establishment of preliminary remediation goals" should be included in item 3.

123. Section 5.2.3.2, Page 5-20 through -21

Deficiency: It is important to list the criteria in order of importance because alternatives that do not pass the first level of analysis may not be viable options for remediation.

Recommendation: Revise the order of the nine criteria to be consistent with CERCLA guidance. The order of importance is as follows:

Threshold Criteria	Overall Protection of Human Health and the Environment
	Compliance with ARARs
Primary Balancing Criteria	Long Term Effectiveness and Permanence
	Reduction in Toxicity, Mobility, or Volume Through Treatment
	Short Term Effectiveness
	Implementability
	Cost
Modifying Criteria	State Acceptance
	Community Acceptance

Deficiency: The objective of the CMS is not to select a remedial action. The detailed analyses of viable IRM alternatives are the results of the IRM focused feasibility studies. The remedial alternatives are only briefly described in the proposed plan. The remedial action is selected in the ROD.

Recommendation: Revise the second paragraph of the section.

Deficiency: Subsections 5.2.3.2.1 *et seq.* do not follow the proper sequence to coincide with the NCP.

Recommendation: Subsections 5.2.3.2.1 *et seq.* should follow the sequence in the above table.

1. "Overall Protection of Human Health and the Environment" should be the first subsection.
2. "Compliance with ARARs" should be the second subsection 5.2.3.2.2. This should include a discussion of compliance with chemical specific, action specific, location specific, and other criteria such as advisories and guidance documents (To Be Considered ARARs). Note that, any remedial alternative that does not pass the threshold criteria cannot be discussed further in the evaluation.
3. "Long Term Effectiveness and Permanence" should be the third subsection, 5.2.3.2.3.
4. "Reduction in Toxicity, Mobility, or Volume Through Treatment" should be the fourth subsection, 5.2.3.2.4.
5. "Short Term Effectiveness" should be the fifth subsection, 5.2.3.2.5.
6. "Implementability" should be the sixth subsection, 5.2.3.2.6". This section should include the following:
 - The ability to construct and operate the technology
 - Reliability of the technology
 - Ease of undertaking additional remedial actions if necessary
 - Ability to monitor effectiveness of remedy
 - Ability to obtain approval from other agencies
 - Coordination with other agencies
 - Availability of off site treatment, storage, and disposal services and capabilities
 - Availability of prospective technologies
7. "Cost" should be the seventh subsection, 5.2.3.2.7. The cost section should include a discussion of capital costs, operating and maintenance cost, and present worth cost.
8. "State Acceptance" should be the eighth subsection, 5.2.3.2.8. This section should include a discussion of the alternatives the state supports, the alternatives that the state has concerns with, and alternatives that the state

opposes. Language about the role of the lead or support regulatory agency should be included.

9. "Community Acceptance" should be the ninth subsection, 5.2.3.2.9. This section should include a discussion of the alternatives the community supports, alternatives that the community has concerns with, and alternatives that the community opposes.

124. Section 5.2.4, page WP 5-24

Recommendation: In the next-to-last sentence, the phrase "focused CMSs" should be inserted after "CMSs."

125. Section 6.0, Figure 6-1:

Note: The letter from USDOE to EPA and Ecology dated DEC 19 1991 (91-ERB-226) states that major remediation at most of the high priority sites cannot begin until after the completion of the N reactor shutdown. Therefore, there is a 24 month delay between completion of the IRM Plan (March 1995) and the start of the Interim ROD preparation (September 1997) so that the Interim ROD is timed to be 15 months prior to completion of the shutdown. The 15 month period reflects the requirement that "substantial continuous physical onsite remedial action shall be commenced at each facility not later than 15 months after completion of the investigation and study," (i.e., after the RFI/CMS).

Deficiency: The schedule for N-Reactor shutdown lacks sufficient detail to evaluate its integration with other activities within the 100 Area, especially within the 24 month period of inactivity. Also, the schedule for preparation and issuance of interim RODs is unclear and is not discussed in the text of the report.

There is no need to delay the start of the interim ROD preparation. Remediation can begin elsewhere on the site before the completion of N reactor shutdown. Work could begin on all of the medium and most of the low priority sites before the end of the reactor shutdown. Also, cleanup of 116-N-4 (Emergency Dump Basin) could begin sooner than January of 1998. In addition, the schedule for the cleanup of 118-N-1 (Spacer Storage Silos) and 1304-N (Emergency Dump Tank) is not shown on the operable unit schedule (Figure 6-1).

Recommendation: Provide a clear and detailed discussion of the schedule and activities of the N reactor shutdown. In addition, provide better justification for the 24-month delay for the start of the Interim ROD report or move the Interim ROD start date to September 1995. The over 15-month delay in remedial action after completion of investigation and study would violate CERCLA.

126. Section 6.0, Figure 6-3:

Comment: This figure shows the drilling schedules for the operable units in the 100 Area. There is a two month gap between the end of HR-1 vadose drilling and the start of BC-1 vadose drilling and BC-5 groundwater drilling. Why is there no drilling scheduled for this time?

Recommendation: Explain the gap in activity.

127. Figure 6-1, Operable Unit Schedule, pocket insert

Deficiency: The text at the bottom of the schedule states that Task 1 - Project Management is not applicable to this operable unit. But, Task 1 - Project Management is included with the tasks to be performed during the RFI at the 100-NR-1 operable unit (Section 5.1) and discussed extensively in Section 5.1.1.

Recommendation: The rationale for not showing Task 1 in the schedule should be explained or Task 1 should be included in the schedule.

Deficiency: The rationale for starting the evaluation of source data approximately 5 months after completion of vadose zone drilling is not provided and should be included. Evaluation of source data prior to completion of drilling may help to identify additional locations where boring is necessary and to obtain additional data without delay.

Deficiency: Site investigations for high priority waste sites are integrated with N-reactor shutdown. However, the schedule for the remediation of 118-N-1 spacer storage silos and the 1304-N emergency dump tank is not included.

128. QAPjP, General:

Deficiency: Many documents and sections of documents are referenced in this QAPjP, but in most cases not enough information is given for the reader to understand what information is available in the referenced document. Several examples are given in the section-specific comments.

Recommendation: A brief synopsis of what information is available in each referenced document or section should be included in a table or, where appropriate, in the QAPjP text.

129. QAPjP Section 1.4, page A-2, first paragraph:

Deficiency: There is little detail included on the project design, such as how the project activities are inter-related and how they will

achieve the project objectives.

Recommendation: Include descriptions of the proposed sampling frequency and locations, how these would relate to the expected temporal and spatial variability of the parameters of interest, proposed dates of activities, and any limitations imposed on the schedule. If these types of information are to be included in the operable unit-specific DOW, then it should be so stated.

130. QAPjP Section 2.2, page A-2

Recommendation: The text should also explain whether the proposed criteria are for only soils or for soils, sediments, and solid wastes. If not included, the criteria to be used for sediments and solid wastes should be stated.

131. QAPjP Section 2.2, page A-2, fourth paragraph:

Deficiency: No standard procedure is identified for determining whether a sample is radioactive and will require special handling.

Recommendation: Describe the procedures to be used for identifying and handling radioactive samples. If standard procedures exist, they should be referenced and abstracts of the procedures provided in the text.

132. QAPjP Section 3.0, page A-3, fourth paragraph:

Deficiency: The criteria for varying the data quality objectives are not discussed.

Recommendation: The text should provide a discussion of the criteria for varying the data quality objectives, such as method quantification limits and precision and accuracy target values listed in Table QAPjP-1. If this information is contained in another document, such as an appropriate operable unit-specific DOW, that document should be referenced.

133. QAPjP Table QAPjP-1

Deficiency: The target quantitation limit (TQL) for tritium in soil is incorrectly reported using the TQL for water.

Recommendation: The proposed TQL for tritium in soil in pCi/g (not in Pci/L) should be provided.

Deficiency: The text in Sections 4.2.2 and 5.1.5.4 states that samples

collected for chemical analysis will be analyzed for the full suite of CERCLA analytes and for radionuclides. Only four radionuclides are included in this table.

Recommendation: The rationale for not analyzing all the radionuclides listed in Table 3-30 (Preliminary List of Contaminants of Interest for the 100-NR-1 Operable Unit) should be explained elsewhere and referenced here. Update the table to be consistent with sections 4.2.2 and 5.1.5.4.

134. Table QAPjP-1, pages A-4 through A-7:

Deficiency: A complete list of the target organic compounds of interest for the project is not provided in this table.

Recommendation: Revise this table to list the individual TAL compounds, rather than just referring to "TAL Volatile Organics," "TAL Semivolatile Organics," and "TAL Pesticide/PCBs."

135. Table QAPjP-1, pages A-4 through A-7:

Deficiency: The limits for precision and accuracy for soils in this table may not be realistic.

Recommendation: Unless the laboratory performing the analyses can easily achieve the stated limits, the recommended precision should be at 30 percent relative percent difference, and the accuracy should be at least 35 percent relative percent difference.

136. Table QAPjP-1, pages A-4 through A-7:

Deficiency: Target quantification limits are not given in this table for either soil or water.

Recommendation: Provide the target quantification limits for soil and water in this table, rather than referencing a method.

137. Table QAPjP-1, pages A-4 through A-7:

Deficiency: Several methods are referred to as modified, but no details are provided.

Recommendation: Provide the modifications to the methods listed for chloride, fluoride, nitrate, phosphate, and sulfate.

138. Table QAPjP-1, pages A-4 through A-7:

Deficiency: No analytical method is listed for tritium (hydrogen-3) in soil.

Recommendation: Provide an analytical method for hydrogen-3.

139. Table QAPjP-1, pages A-4 through A-7:

Deficiency: No information is provided for carbon-14.

Recommendation: Provide carbon-14 analytical methods, target quantification limits, and precision and accuracy requirements for both soil and water samples.

140. QAPjP Section 4.2.1, page A-9, second paragraph:

Deficiency: Not enough information is provided in this section on the different sampling methods which will be used.

Recommendation: In cases where other documents are referenced, the text should provide a brief synopsis or abstract or the information provided in the referenced document. For example, for EII 5.9, *Soil Gas Sampling*, the type of monitor or equipment that may be used should be specified.

141. QAPjP Section 4.2.1, page A-9, second paragraph:

Deficiency: There are no criteria provided on how sample locations will be chosen.

Recommendation: The text should provide this information or reference the appropriate operable unit-specific DOW for specific information about sampling.

142. QAPjP Section 4.2.1, page A-9, second paragraph:

Deficiency: EII 5.9, *Soil Gas Sampling*, is referenced as being applicable in Section 4.2.1, but is not included in Table QAPjP-2.

Recommendation: Revise Table QAPjP-2 to include EII 5.9.

143. QAPjP Section 4.2.2, page A-9, third paragraph:

Deficiency: Not enough detail is provided in the text regarding sample

containers, preservation, and selection criteria.

Recommendation: A table listing type of sample or analyte, sample container and cap type, preservation requirements, preparation requirements, and special handling requirements should be included in this section. The text should be expanded to include selection criteria for sample containers.

144. Table QAPjP-2, pages A-10 through A-12:

Deficiency: If air or filter samples are to be collected during Task 7, chain-of-custody procedures must be followed.

Recommendation: Reference EII 5.1 as applicable to Task 7.

145. Table QAPjP-2, pages A-10 through A-12:

Deficiency: EII 5.12, *Air Quality Sampling of Ambient and Downwind Air at Waste Sites*, is not listed in Table QAPjP-2.

Recommendation: List EII 5.12 in Table QAPjP-2.

146. Table QAPjP-2, pages A-10 through A-12, footnote f:

Deficiency: Laboratory data validation should be carried out following *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (U.S. Environmental Protection Agency, 1988) or *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses* (U.S. Environmental Protection Agency, 1985), when appropriate.

Recommendation: Reference these two guidelines as required guidance for laboratory data validation.

147. QAPjP Section 6.0, page A-13, third paragraph:

Deficiency: The information provided for calibration procedures is insufficient.

Recommendation: A table should be included that states the type of equipment, frequency and type of calibration, list of standards, acceptance criteria for calibration measurements, and reference document(s) for performing the calibration.

148. QAPjP Section 7.0, page A-14, first paragraph:

Deficiency: The criteria to be used for varying the analytical methods, the method quantification limits, and the precision and accuracy target values listed in Table QAPjP-1 are not discussed

Recommendation: Provide the criteria for changing analytical procedures methods, method quantification limits, and other specifications listed in Table QAPjP-1.

149. QAPjP Section 7.0, page A-14, second paragraph:

Deficiency: No information is provided in this section of the standard units that will be required for analytical procedures.

Recommendation: This information should be provided, or the appropriate document that contains this specific information should be referenced.

150. Table QAPjP-3, page A-15:

Deficiency: Specifications for the method by which soil physical parameters will be determined are not provided.

Recommendation: A list of requirements should be provided; the methods must be submitted for regulatory review prior to use.

151. QAPjP Section 8.2, page A-16, second paragraph:

Deficiency: Laboratory data validation should be carried out following *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (U.S. Environmental Protection Agency, 1988) or *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses* (U.S. Environmental Protection Agency, 1985), when appropriate.

Recommendation: Reference these two guidelines as required guidance for laboratory data validation.

152. QAPjP Section 8.4, page A-17, first paragraph:

Deficiency: The text does not make clear who is responsible for evaluating the data.

Recommendation: The individual or group responsible for performing data evaluations should be designated.

153. QAPjP Section 8.4, page A-17, first paragraph:

Deficiency: Procedures for sample identification, data entry, and data revisions in the HEIS database are not referenced.

Recommendation: Describe how the data will be entered into and revised in HEIS.

154. QAPjP Section 10.0, page A-19, second and third paragraphs:

Deficiency: The terms "regularly" and "routine" are used to describe the frequency of auditing activities.

Recommendation: Specify the minimum frequency at which each of the auditing activities will be performed.

155. QAPjP Section 11.0, page A-19, third paragraph:

Deficiency: The information provided on preventive maintenance procedures is insufficient.

Recommendation: A table with type of equipment, frequency and type of maintenance, and reference document(s) for performing the preventive maintenance should be included.

156. QAPjP Section 13.0, page A-20, second paragraph:

Deficiency: No responsible group or individual is referenced for corrective action.

Recommendation: Provide a chart that shows corrective action responsibilities.

157. QAPjP Section 13.0, page A-20, second paragraph:

Deficiency: No time frame for procedural or plan corrections is provided.

Recommendation: A time frame for resolution of procedural or plan corrections should be provided.

158. QAPjP Section 13.0, page A-20, second paragraph:

Deficiency: Laboratory corrective actions and quality control procedures are not discussed in this section.

Recommendation: Expand the text to provide a description of these activities. If possible, reference appropriate documents, such as the laboratory quality assurance program plan.

159. QAPjP Section 13.1, page A-20, third paragraph:

Deficiency: No procedures are provided regarding the fate of data or samples collected, if equipment is found to be operating outside acceptable operating ranges or used after the expiration date for calibration.

Recommendation: If no existing procedure covers resampling or reanalysis under these circumstances, one should be generated; if one exists, it should be referenced and an abstract of the procedure included in the text.

160. QAPjP Section 14.0, page A-21, first paragraph:

Deficiency: The term "regularly" is used to describe the frequency of auditing and associated corrective action processes.

Recommendation: Specify the minimum frequency at which these activities will be performed.

161. QAPjP Section 14.0, page A-21, first paragraph:

Deficiency: No schedule is given for the generation of quality assurance reports.

Recommendation: A schedule for submittal of quality assurance reports should be provided in the QAPjP, or provided in the work plan and referenced in the QAPjP.

162. QAPjP Section 14.0, page A-21, first paragraph:

Comment: Reference is made to Chapter 1.0 for Task 12, but Task 12 is not discussed in Chapter 1.0 of either the Work Plan or the QAPjP.

Recommendation: Correct this reference.

163. QAPjP Section 14.0, page A-21, first paragraph:

Deficiency: Assessment of data accuracy and completeness is not mentioned as being included in any report but the final quality assurance report.

Recommendation: An assessment of data accuracy and completeness should be included in each quality assurance report.

164. Appendix C, Table C-2, pages C-5 and C-6

Recommendation: Under Task 2, the parameters for the proposed five analytes per soil gas sample are not discussed elsewhere and should be. Also, it is not clear how the total number of analyses per sample was calculated for the task sampling and analysis. A footnote indicating the separate number of analyses for each target compound list volatile organic, semivolatile organic, and pesticides/PCBs; target analyte list inorganic; radionuclide; and other compound should be provided to verify the total data points. The proposed number of samples for the soil gas survey and source sampling (surface soils) should be clearly stated elsewhere in the text.

Recommendation: In Task 5, the way in which total samples are arrived at for borehole soil sampling and soil sample analysis should be explained or footnoted. It appears that analyses per sample are incorrectly reported for borehole soil sampling. Analyses per sample should be five (for physical property data) instead of 135. This discrepancy should be corrected.

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ECOLOGY COMMENTS ON
RCRA FACILITY INVESTIGATION/CORRECTIVE MEASURES STUDY WORK PLAN FOR THE
100-NR-2 OPERABLE UNIT, HANFORD SITE, RICHLAND WASHINGTON

General Comments:

1 2 1 2 9 7 1 3 6 1 7 1 9 6 1 2 1 2 1 7 1

The RCRA facility investigation/corrective measures study (RFI/CMS) work plan includes preliminary treatment technology selection for contaminated groundwater and aquifer soils. However, the work plan does not include a discussion of the need or present the schedule for treatability studies to evaluate the technologies for interim response actions. EPA (1988) recommends that once remedial actions involving treatment have been identified for a site, the need for treatability studies should be evaluated as early as possible in the work plan, since many treatability studies, especially pilot testing, may take several months or longer to complete. For example, the work plan states that treatment of tritium may be impractical and that alternative concentration limits may be required if tritium contaminated groundwater represents a significant risk or is in conflict with applicable or relevant and appropriate requirements (ARARs). In that case, treatability testing results or data from literature are needed to determine whether a potential technology is feasible. If a longer study is required and is not initiated early, completion of the focused feasibility study may be delayed. This concern potentially applies to many other treatment technologies.

The rationale for excluding the development of analytical methods and associated method detection limits and sample quantitation limits according to the risk-based concentrations described by EPA (1991) is not provided or referenced. The overall objectives of the analytical plans are to obtain analytical results that satisfy the data quality objectives and to evaluate potential site contamination with regard to the risk-based concentrations. Based on these objectives, analytical methods should be selected to achieve method detection limits and sample quantitation limits below risk-based concentrations (if technically possible).

The surface water and sediments investigation for the 100 Area does not address the data needs for determining the nature and extent of contamination in the surface water and river sediments adjacent to and in the vicinity of the 100-NR-2 groundwater operable unit.

1. Section 1.0, Page WP 1-2, first paragraph on this page:

Deficiency: How will activities between Operations, D&D, and the ER programs be coordinated? During the February 27, 1992 100-N Area Unit Manager Meetings, USDOE informed Ecology that they "wanted relief" from coordinating with Operations and D&D. Ecology stated this was unacceptable, and that this issue be discussed by the Project Managers as soon as possible.

Recommendation: Expand the text to explain exactly how this integration/coordination will take place and who will be responsible.

2. General all Sections:

Deficiency: This document does not provide any information concerning actions to be taken after the IRM ROD. USDOE must show a commitment to address all contaminated areas within the 100-NR-2 Operable Unit boundaries not just the IRM sites.

Recommendation: Strengthen Section 1 and Section 5 to describe how interim actions fits in to scheduled work within the entire 100-NR-2 Operable Unit.

3. Section 1.1, Page WP 1-2:

Deficiency: This section is entitled, "Purpose and Scope of the RCRA Facility Investigation/Corrective Measures Study", but it does not discuss the purpose of a RFI/CMS study.

Recommendation: Revise the text to state "The purpose of the RI/FS and processes is not the unobtainable goal of removing all uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site"(See Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA October 1988).

4. Section 1.1, Page WP 1-3, last bullet:

Deficiency: The text indicates that the interim remedial measure (IRM) path will be selected where existing data are sufficient. However, the IRM path is selected for some facilities by evaluating analogous facilities, sampling analogous facilities, and applying knowledge gained. The text should clearly define the selection criteria for the IRM path.

Recommendation: Revise the text to more clearly reflect the selection criteria for the IRM path.

THE FOLLOWING 3 COMMENTS PERTAIN TO THE LATEST VERSION OF SECTION 1.0 AS DISCUSSED FOR BC-1 AND BC-5 (ITC AND GOLDER REDLINE)

5. Section 1.1.1, Page 1-2, first paragraph:

Deficiency: This Section is confusing and vague. For example, it is difficult to identify the decision points?

Recommendation: Include a simple flow chart such as the attached "Chapter 1 Flow Chart".

6. Section 1.1.1:

Deficiency: This Section does not explain the RI/FS process. It does not present the proper sequence of reports, nor explain why the agencies are doing investigations differently at Hanford.

Recommendation: Revise this Section to explain this modified investigation strategy. Describe in chronological order the sequence of investigations, actions and documents. The following discussion suggests some recommendations that could clarify this section:

Recommendations:

1.) The first subsection should be the 100-NR-2 Work Plan.

2.) The second subsection should be the High Priority Sites Limited Field Investigations (LFI). Discuss the process for selecting high priority sites. Include a discussion of DOW's and how they are used to implement limited field investigations. Include a discussion of what happens if the LFI's results do not support an IRM to remove contaminants. State that these subunits will be managed as part of the 100-NR-2 RI/FS and ROD.

3.) The third subsection should describe the LFI Report. This subsection should state that this report will discuss the results of the LFI's.

4.) The fourth subsection should describe the 100 Area Feasibility Study. Discuss the purpose of and content of the 100 Area F.S.

5.) The fifth subsection should describe the 100 Area Aggregate Studies. Discuss the reports that make up the 100 Area Aggregate Studies.

- 6.) The sixth subsection should describe the 100-NR-2 Focused Feasibility Study. Discuss the content of the 100-NR-2 Focused Feasibility Study.
- 7.) The seventh subsection should describe the 100-NR-2 IRM Proposed Plans. Discuss the contents of the Proposed Plan.
- 8.) The eighth subsection should describe the 100-NR-2 IRM ROD's. Discuss that these ROD's could be separate or combined into one report. Discuss that all ROD's are written by the lead regulatory agency. Discuss that the ROD will include a Responsiveness Summary to address public comments received in response to the Proposed Plan.
- 9.) The ninth subsection should describe the IRM Design Report. Discuss that this Design Report will be a primary document and that public involvement will not be solicited. Include that as a part of the IRM implementation, confirmational sampling will occur to verify the success of the IRM.
- 10.) The tenth subsection should describe the IRM Implementation. Discuss IRM implementation.
- 11.) The eleventh subsection should describe the 100-NR-2 Remedial Investigation. This RI will discuss the success of the IRMs and present the sampling results collected as part of the IRM.
- 12.) The twelfth subsection should describe the 100-NR-2 Feasibility Study. Discuss that this is a primary report that includes high priority sites as well as low priority sites that may or may not require additional action.
- 13.) The thirteenth subsection should describe the 100-NR-2 Proposed Plan. Discuss the purpose of this proposed plan and what information it will contain.
- 14.) The fourteenth subsection should describe the 100-NR-2 Operable Unit ROD. Discuss the purpose of the 100-NR-2 Operable Unit ROD.
- 15.) The fifteenth subsection should describe the 100-NR-2 Operable Unit Remedial Design/Remedial Action Report. Describe what will be contained in this report.
- 16.) The sixteenth subsection should describe the 100 Area NPL Site Proposed Plan. Describe the 100 Area NPL Proposed Plan.
- 17.) The seventeenth subsection should describe the 100 Area NPL Record of Decision. Discuss the content of the 100 Area ROD, and state that it will not be issued until all the operable unit RODs are complete.

7. Section 1.3, Page WP 1-5:

Deficiency: No mention is made of the operable unit-specific description of work (DOW) for sampling and analysis.

Recommendation: Include a discussion of the relationship between the work plan and the DOW for this operable unit. Also incorporate in this section a brief discussion of the type of information that will be included in the DOW for this operating unit (e.g., a detailed description of sampling locations, sampling dates, sampling methods, level of analysis, and level of data validation) or reference and place in the section of the workplan where the DOWs are detailed.

8. Section 2.1.1, Page WP 2-1, fifth paragraph on this page:

Deficiency: Possible contamination originating from the Hanford Generating Plant (HGP) or the Bonneville Power Administration (BPA) substation that may affect the general 100-N Area is not considered in the work plan.

Recommendation: Waste generating processes and contaminant releases from the HGP and the BPA substation should be discussed in this work plan because of the potential effect on the groundwater and surface water in the 100-N Area. In addition, the text should identify who has the responsibility for identification and remediation of contaminants from these facilities.

9. Section 2.1.5, Page WP 2-11, fifth paragraph on this page:

Deficiency: The text lacks any discussion of coordination of activities and exchange of data between the managers of the different operable units.

Recommendation: Expand the text to include a discussion of the coordination of work plans and data exchange between the managers of the different operable units.

10. Section 2.2.2.1.2, Page WP 2-15, second paragraph on this page:

Deficiency: The text "intercalculated" should be "intercalated".

Recommendation: Make the correction in the text.

11. Section 2.2.2.2.3, Page WP 2-18, second paragraph on this page:

Comment: The text discusses the uncertainty in the explanation for an

increase in gamma counts for natural gamma geophysical logs taken in wells 199-N-36 to 199-N-45. This uncertainty might be alleviated by running the spectral gamma logging tool in these wells.

Recommendation: Include these wells in the subtask 5d, geophysical borehole logging, to further refine the conceptual model.

12. Section 2.2.3.2, WP 2-19, fourth & fifth paragraphs on this page:

Deficiency: The two paragraphs in this section describe the hydrogeology of the 100-N Area. However, the author(s) do not cite references to support either the use of nomenclature nor the stated conclusions.

Recommendation: Please include the appropriate references in the text.

13. Section 2.2.3.2.2, WP 2-20, third paragraph on this page:

Deficiency: The text states that the "percolation rates in the area dropped 'precipitously' during the first 100 h of testing, ...". How much is "precipitously"?

Recommendation: Please be more specific and include the figures that descibe this drop in percolation rates.

14. Section 2.2.3.2.2, WP 2-21, fourth paragraph on this page:

Comment: The sentence "The reported range of hydraulic conductivities in this interval." is redundant text that can be removed from this paragraph.

Recommendation: Make the needed corrections to the text.

15. Section 2.2.3.2.2, WP 2-21, fourth and fifth paragraphs on this page:

Deficiency: The text states there are no 100-N area data available for the "B" and "C" layers should be substantiated through a bibliography (indicating documents that were examined prior to writing this workplan). This is a specific data gap that should be included as part of task 6a and the associated field activities that could reduce this data gap. This is similar to the tasks that would be included in the HR-3 workplan.

Recommendation: Include a bibliography in the workplan that would document the various studies that were examined prior to the writing of this workplan. If all available documents had not been examined prior

to the writing of this workplan. this task will be a starting point for task 6a. If the data gap still exists at the completion of task 6a, it may be necessary to include additional field work as part of this workplan or subsequent LFIs.

16. Section 2.2.3.2.2, WP 2-22, third paragraph on this page:

Comment: In the "Basalt Confining Layer D" section, the conversion of m/d to ft/d is incorrect.

Recommendation: Make the needed corrections to the text.

17. Section 2, Page WP 2F-1, Figure 2-1:

Comment: Figure 2-1 does not show the location of the 130-N-1 filter backwash pond. This pond location may be just off the map. However, the figure should be modified to include this facility and its relationship to the rest of the 100-N Area.

Recommendations: At a minimum, include the filter backwash pond in this figure or reference some map in the workplan that does show this facility and include this citation in the text on page WP 2-23.

18. Section 2, Page WP 2F-5, Figure 2-5:

Deficiency: Figure 2-5 needs reference points such as the reactor building, other engineered facilities, or the outline of the NR-2 operable unit boundary.

Recommendations: At a minimum, provide the NR-2 boundary and some other landmark to help locate the topographic elevations on this figure.

19. Section 2, Pages WP 2F-19 and WP 2F-21 through WP 2F-23, Figures 2-19 and 2-21 through 2-23:

Deficiency: Figures 2-19 and 2-21 through 2-23 show water levels in the 100-N Area on various dates. These figures provide little detail with which to orient the reader, especially with respect to the impact of specific major facilities (e.g., the 116-N-1 and 116-N-3 Crib and Trench areas) on the formation of groundwater mounding and the location of discharges of groundwater at the N Springs.

Recommendations: At a minimum, label the major landmarks shown on the figures that are suspected of having contributed to the discharges at the N Springs (e.g., the 116-N-1 and 116-N-3 Crib and Trench areas) during the specific time periods represented by each figure. Show the

approximate locations of specific N Springs discharge points that were active on the specific dates represented by each figure. Show the boundary of the 100-NR-2 Operable Unit. This information will help in testing hypotheses regarding the cause and effect relationships between known discharges to soil from specific facilities (e.g., the crib and trench areas), the observed water level contours and groundwater flow regimes at the time of facility operation, and the observed discharges of groundwater at specific N Springs locations.

20. Section 2, Page WP 2F-20, Figure 2-20:

Comment: Figure 2-20 shows the location of the N Springs. This figure provides little detail with which to orient the reader.

Recommendations: At a minimum, label the major landmarks shown on the figure that contribute to the discharges at the N Springs (e.g., the 116-N-1 and 116-N-3 Crib and Trench areas; 120-N-1 Percolation Pond; 120-N-2 Surface Impoundment; 130-N-1 Filter Backwash Discharge Pond). Show the boundary of the 100-NR-2 Operable Unit.

21. Section 3.1.1, Page WP 3-1, third paragraph:

Deficiency: The description of criteria for inclusion in this work plan is inadequate.

Recommendation: Describe the criteria used to determine "high priority sources" and "large volume unplanned releases" included for discussion in this section. Several large volume (> 1,000 gal) releases have not been included in this report including: UN-100-N-9, 124-N-4 (septage), Corridor 22 UPR (volume unknown), UN-100-N-7, UN-100-N-32, UN-100-N-30, UN-100-N-2, UN-100-N-1, UN-100-N-19, 6-14-86 UPR, UN-100-N-34, 6-30-86 UPR, UN-100-N-33. Why were these releases not included in this report?

22. Section 3.1.1.1, Pages WP 3-1 through WP 3-2:

Deficiency: The description of waste disposed in 116-N-1 Crib and Trench is insufficient.

Recommendation: Describe criteria used to select radionuclides and dangerous waste for inclusion in Table 3-2 of the work plan. Data from the *Liquid Effluent Study Final Project Report* (WHC, August 1990) description of N Reactor effluent indicate that many more compounds have been released than are described here. Why is there a discrepancy? The omission of many organic compounds is misleading and could result in an underestimation of the severity of contamination in this area. Describe whether the lb/yr of dangerous waste solution are weights of the solution or weights of the dangerous constituent. Describe the nature

of releases to the trench. Were they continuous or batch?

23. Section 3.1.1.2, Pages WP 3-2 through WP 3-3:

Deficiency: The description of the transfer lines to the tanks is insufficient.

Recommendation: Describe whether piping or other underground transfer routes to or in the facility have been checked for leaks. These could be a significant source of contamination. If these areas have not been checked, they may warrant consideration for further investigation.

24. Section 3.1.1.3, Pages WP 3-3 through WP 3-4:

Deficiency: The descriptions of waste disposed in 116-N-3 Crib and Trench is insufficient.

Recommendation: Describe criteria used to select radionuclides and other wastes for inclusion in Table 3-3 of the work plan. Data from the *Liquid Effluent Study Final Project Report* (WHC, August 1990) description of N Reactor influent indicate that many more compounds have been released than are described here. Also, describe whether the lb/yr of dangerous waste solution are the weights of the solution or the weights of the dangerous constituent. Describe the nature of releases to the crib and trench -- were they continuous or batch?

25. Section 3.1.1.6, Page WP 3-7, first paragraph on this page:

Deficiency: The description of the water in the spacer storage silos is insufficient.

Recommendation: Describe whether the water has ever been tested for radionuclides and what the results were. Two of the silos are open to the soil and may be significant contaminant sources. What is the typical composition of this water?

26. Section 3.1.1.8, Page WP 3-8, fourth paragraph on this page:

Deficiency: The description of the 20-cm transfer line to the day tank is insufficient.

Recommendation: Describe whether the transfer line has been checked for leaks besides the 4-26-89 UPR. It is possible that the transfer line has had slow leaks along its length and could be a more significant source than is indicated here.

27. Section 3.1.1.8, Page WP 3-9, second paragraph, first bullet:

Deficiency: The description of UN-100-N-17 is insufficient.

Recommendation: Show the location of the burn pit on Figure 3-2. Describe any soil sampling that has been done in this area. It is likely that there is significant hydrocarbon contamination in this area.

28. Section 3.1.1.9, Page WP 3-9, first and second paragraphs of section:

Deficiency: What is meant by the "mixed waste leak" in the first paragraph of this section? Is this an indication that both hazardous and radioactive waste leaked from this drain line? In the second paragraph there is a typo for ruthenium-103 (it is stated as ruthenium-03).

Recommendation: Please clarify the meaning of the mixed waste leak and correct the typo in the next paragraph.

29. Section 3.1.2.1, Page WP 3-12, third and fourth paragraphs on page:

Deficiency: Soil samples used to determine background concentrations for contaminants in 100-N Area soils were collected onsite and apparently near source areas (e.g., 120-N-2 percolation pond). The text acknowledges the limits of their usefulness as data for determining representative site background concentrations. The presence of volatile and semivolatile compounds, which are typically at or below detection limits in most undisturbed areas in these soils, suggests that these data may not be representative.

Recommendation: The analytical results should be compared to those of historical and recent regional and Hanford-wide soil data. The text should describe how and when (by reference to Section 5) this comparison will take place.

30. Section 3.1.2.1, Page WP 3-13, first paragraph on this page:

Comment: The statement about offsite samples collected in a downwind direction has been revised based on comment #34 for HR-3.

Recommendation: This section should be revised based on disposition of comments for HR-3, comment #34.

31. Section 3.1.2.2.2, Page WP 3-13, fourth paragraph on this page:

Comment: The figure reference is incorrect.

Recommendation: No wells are shown in Figure 2-20, as indicated in the text. Correct the figure reference.

32. Section 3.1.2.2.2, Page WP 3-14, second paragraph on this page;

Deficiency: The references to "studies" is unclear. The entire paragraph is unclear. It makes references to some studies but no reference or other context is provided. Is the reference to Robertson et al. (1984)?

Recommendation: Reference the "studies" of which mention is made. Expand the discussion on "attenuation." Also, explain that the attenuation capacity of a soil is not infinite. At some point ion exchange sites will become saturated and the soil will reach equilibrium with the contaminant solution so that precipitation no longer occurs. The "attenuation" of some contaminants will cease at this point. If the source of contamination is removed, these contaminants will probably begin to partition back into solution (groundwater). This attenuation is not necessarily permanent.

33. Section 3.1.3.1, Page WP 3-14, fourth paragraph on this page;

Deficiency: The text states that sufficient data are not available for establishing background groundwater quality at the 100-N Area. The text presents background values that are based on data from other areas of the Hanford site. Hoover and LeGore (1991) note that natural groundwater quality varies across the Hanford site as a result of geochemical processes. Therefore, data extrapolated from other areas of the Hanford site may not be representative of site conditions at the 100-N Area.

Recommendation: The RFI work plan should discuss how groundwater quality background values for the 100-N Area will be determined. Include the installation and sampling of properly sited monitoring wells in this discussion.

34. Section 3.1.3.2.1, Page WP 3-14, fifth paragraph on this page;

Comment: The text indicates that groundwater monitoring wells located in the 100-N Area are shown in Figure 2-20. The wells are shown in Figure 2-12.

Recommendation: The text should be corrected.

35. Section 3.1.3.2.1, Page WP 3-15, fourth paragraph on this page:

Comment: The text states that Tables 18 and 19 identify parameters in the regular and short lists. That information is contained in Tables 17 and 18.

Recommendation: The text should be corrected.

36. Section 3.1.3.2.2, Page WP 3-17, first paragraph on this page:

Deficiency: This section is deficient in that it does not address several issues related to discharge of contaminants other than tritium and strontium-90. Subsequent paragraphs on page WP 3-17, discussing the factors affecting fate and transport of contaminants released to soil and ultimate discharge to the Columbia River, are difficult to follow.

Recommendation: Clarify that tritium is intended to be representative of highly mobile contaminants (i.e., those that migrate at approximately the same rate as groundwater flow) and that strontium-90 is intermediate in degree of adsorption to soil (e.g., create logical link between this text and previous text in third paragraph of page WP 3-16).

Provide a table and accompanying discussion that describes the expected fate (e.g., relative degree of mobility) of each of the contaminants known or suspected of having been discharged to the 100-NR-2 Operable Unit groundwater. This information should be cross-referenced by other sections of the Work Plan that describe the known and potential future impacts of other ions (e.g., sodium) that may remobilize contaminants adsorbed to soil.

Clarify/edit the subsequent paragraphs on page WP 3-17 regarding the discussions of release, adsorption/mobility, and equilibrium of contaminants partitioning between soil and groundwater.

37. Section 3.1.3.2.3, Page WP 3-21, third paragraph on this page:

Deficiency: Groundwater samples should be compared to Drinking Water Standards (DWS) and WAC 173-200 "Water Quality Standards for Ground Waters of the State of Washington."

Recommendation: Compare groundwater analyses to DWS and WAC 173-200.

38. Section 3.1.3.2.3, WP 3-23, last paragraph on this page:

Comment: Large amounts of sodium were discharged to the 120-N-1 percolation pond, and high concentrations of sodium were observed in the vicinity and down gradient of 120-N-1. As the ground-water mound from

1325 N dissipates, the direction of ground-water flow in the N-Area is likely to shift to a more northeasterly direction, and the sodium plume from 120-N-1 may shift toward 1301. If this occurs, sodium, as an exchangeable cation, may replace Sr-90 sorbed onto the aquifer matrix resulting in an increased release and greater mobility of Sr-90 in ground water. The movement of sodium and its influence on Sr-90 mobility should be a focus of the 100-NR-2 remedial investigations. Describe this facet of the investigation.

39. Section 3.1.4, Page WP 3-24 to 3-29:

Deficiency: This section is inadequate. It provides very little information on which to evaluate existing data and determine the scope of additional studies. There is an acknowledgement that chemical data, "are not currently available," but there is no commitment to gather these data. Section 5.1.4, task 4 text provides little confidence data gaps will be filled. Appendix D-1 is not much help.

Recommendation: Expand the text, specifically describing the need for additional studies. Expand Section 5.1.4 so that it is self-explanatory, i.e., provide enough information to define specific sediment sampling requirements.

40. Section 3.1.4.1, Page WP 3-26, first paragraph on this page:

Comment: Tritium-3 should be either hydrogen-3 or tritium. (This also applies to paragraph 4 on WP 3-28, under section 3.1.4.2.2)

Recommendation: Please make the corrections to the text.

41. Section 3.1.4.4, Page WP 3-29, second paragraph on this page:

Comment: The word "absorbed" should be "adsorbed".

Recommendation: Please make the corrections to the text.

42. Section 3.1.6.1, Page WP 3-29, sixth paragraph of this page:

Deficiency: This section discusses the collection of vegetation for analysis for radionuclide content. The text refers to Table 3-32, which presents average concentrations of selected radionuclides in vegetation samples collected during the period 1980-88. The text and Table 3-32 are deficient in that no basis for comparison is provided with which to evaluate the observed levels of radionuclides.

Recommendation: Table 3-32 and/or the text should be supplemented with information against which the radionuclide content of the vegetation samples could be evaluated. Examples include; presentation of data for radionuclide content in control samples of vegetation from uncontaminated areas, comparison with regulatory standards (if available), or presentation of some other basis for evaluating the magnitude and significance of the observed levels of contamination. Trends over time (e.g., decreases in activity) also are more usefully evaluated relative to a fixed guideline, such as a health-based guideline or background activity level.

43. Section 3.1.6.1, Page WP 3-30, second paragraph on this page:

Deficiency: The removal action of contaminated vegetation in 3/90 and 12/91 should be more fully described.

Recommendation: Describe why and how these actions occurred. Describe how the data will be used.

44. Section 3.2, Page WP 3-31 through WP 3-37:

Deficiency: This section has been rewritten according to discussions on the 100-DR-1, 100-BC-1 and 100-BC-5 operable unit workplans.

Recommendation: Please make changes according to disposition of the 100-DR-1, 100-BC-1, and 100-BC-5 workplan comments on potential corrective action requirements.

45. Section 3.3, WP 3-37, et seq.

Deficiency: Refer to the letter from Ecology, to USDOE, dated February 27, 1992, regarding section 3.3.

Recommendation: The following version of section 3.3, partially based on a 100-BC-1 preliminary draft, would be fundamentally satisfactory to Ecology.

~~The purpose . . . unit.~~ The purpose of this section is to develop a conceptual site model. Information on the waste sources, pathways, and receptors at a site is used to develop a conceptual understanding of the site to evaluate potential risks to human health and the environment. This effort, in addition to assisting in identifying locations where LFIs, ERAs, and IRMs are necessary, will also assist in the identification of potential remedial technologies. This assessment is based on currently available information regarding the contaminant sources, locations, and quantities described in section 3.1, and . . .

unit. The conceptual model is developed in Section 3.3.1 and identifies potential contaminant sources, release and transport mechanisms, exposure routes, and receptors. ~~The objectives~~ RFI/CMS-Section 3.3.2 explains the current selection of sites for ERAs. The conclusions in this section are tentative and will be subject to refinement based on the results of the RFI.

Due to the qualitative methodology and limited data upon which this assessment is based, neither the structure nor conclusions of section 3.3 are intended to limit the focus of subsequent risk assessments. A quantitative risk assessment will be conducted as described in section 5.1.11.

Section 3.3.1, WP-37, first paragraph.

Based . . . developed. This conceptual model of exposure pathways is not intended to be an exhaustive analysis. However, it does serve as the basis for identifying sites for LFIs and sites where ERAs and IRMs may be implemented. The model . . . plan.

* * *

3.3.1.1 through 3.3.1.6

* * *

3.3.2 and 3.3.3

(Delete these sections and replace them with the following redraft of section 3.3.4, renumbered as 3.3.2.)

3.3.2 (former 3.3.4) ~~Imminent~~ Assessment of Need for ERA

During work plan rescoping, information presented in the previous draft of this work plan was used as the basis for identifying high priority sites for conducting LFIs, sites or routes of exposure for conducting IRMs, and for determining that ERAs are not currently warranted. The conceptual exposure pathway model provides information which was used as one basis for making these rescoping decisions. In deciding whether an ERA was appropriate, both technical engineering judgement, and an evaluation of potential threat to human health and the environment were considered. The decision for an ERA was made based on the immediacy and magnitude of the potential threat to human health and the environment, the nature of appropriate corrective action,

and the implications of deferring the corrective action until the RFI/CMS study is completed. The conclusions in this section are tentative, and will be subject to refinement based on the results of the RI.

~~This discussion . . . (EPA-1988d).~~ During work plan rescoping, the three parties did not identify any situations at the 100-NR-1 operable unit that warranted response through an ERA.

3.3.2.1 (former 3.3.4.1) Human Health.

Based . . . does not appear to warrant . . . health that this time to pose an immediate danger to the public. Although several contaminants have been disposed of and detected in the ground water and in N-springs (recently ⁹⁰Sr and gross gamma values have been reported to be as much as 3200 and 6800 pCi/l, respectively, in the N-springs water; USDOE, 1992), the conceptual exposure pathway model indicates that onsite workers are currently the more significant potential human receptor population.

Vegetation control, such as removal of mulberry trees, has been initiated in August 1990 and, more recently, in December 1991. Placement of rip-rap along the Columbia River adjacent to discharging springs has also been utilized to prevent direct access to these springs by potential human receptors.

Releases from the site through the N-springs will be addressed as a high-priority IRM in the 100-NR-2 operable unit.

3.3.2.2 (former 3.3.4.2) The Environment

Based on information provided in section 3.1, it does not appear that . . . at this time at this time that an ERA is warranted to address contaminants associated with the 100-NR-1 operable unit.

3.3.3 (former 3.3.5) Summary

Preliminary . . . facilities. The currentThe predominant . . . humans offsite. A preliminary . . . radionuclides. Based on current knowledge, it is believed that a finding of imminent and substantial endangerment to human health or the environment is not warranted, nor are any ERAsno ERAs are warranted at this time. Outside . . . section.

46. Section 3.3.1.3, Page WP 3-38, tenth paragraph of this page:

Deficiency: The text indicates that contaminants can reach the river in two ways. A third way is via air transport of contaminated soils.

Recommendation: Air transport of contaminated soils should be included as a third means of contaminants reaching the river.

47. Section 3.3.1.5, Page WP 3-39, sixth paragraph of this page:

Deficiency: This section discusses receptors (organisms that have the potential for exposure to the released contaminants). This paragraph discusses humans who could be exposed to potentially contaminated drinking water (e.g., populations in Richland, Kennewick, and Pasco who withdraw Columbia River water as a source of domestic supply). The last sentence in this paragraph states that, in addition to those exposed to potentially contaminated drinking water, human receptors also include those who engage in any of the other activities described in Section 3.3.1.2. Review of Section 3.3.1.2 reveals that this section discusses release mechanisms, and provides no information regarding human activities that could lead to exposure.

Recommendation: Review/revise the cross-reference to Section 3.3.1.2. Provide a correct cross-reference to other text describing human activities (e.g. recreational use) that could lead to exposure to contaminants from the 100-NR-2 Operable Unit. It appears likely that the correct cross-reference should be to Section 3.3.1.4.

48. Section 3.3.1.5, Page WP 3-39, seventh paragraph of this page:

Comment: The description of irrigation intakes is incomplete. There is no way to determine where and how far away these intakes are from the 100-NR-2 operable unit.

Recommendation: Describe the location of irrigation intakes, or locate them on a figure.

49. Section 3.4.2, Page WP 3-45, third paragraph of this page:

Deficiency: The list of general interim response actions does not include detoxification measures.

Recommendation: Measures, such as bioremediation or neutralization, for detoxifying contaminants should be included in the list of general interim response actions.

50. Section 3.4.3, pages WP 3-47 and WP 3-48

Comment: The process options for treatment of extracted groundwater should be clearly identified on the basis of the contaminants of interest listed in Table 3-42, page WP 3T-42. Also, a brief explanation of the selection of each process option based on contaminant removal should be included.

Similarly, the process options for the treatment of aquifer soils should be clearly identified and presented under a separate heading: Alternative Treatment Technologies for Aquifer Soils. The technology screening should be based on the contaminants of interest in the aquifer soils.

In order to evaluate the effects of lixiviants and fixatives in the aquifer, the types of chemicals planned for use in the leaching and fixation process should be specified.

51. Section 3.4.4, Pages WP 3-48 through WP 3-50:

Comment: The text fails to include the prioritization of different corrective measure alternatives.

Recommendation: MTCA gives preference to alternatives that detoxify contaminants or remove them from a site rather than leave them onsite. Prioritization of corrective measure alternatives based upon MTCA should be included in the strategy for evaluating those measures.

52. Figure 3-2, Page WP 3F-2:

Comment: 116-N-4 is not labeled on this figure.

Recommendation: Label 116-N-4 on this figure.

53. Figure 3-21, Page WP 3F-21:

Comment: Ruthenium-100 should be Ruthenium-106 in this figure.

Recommendation: Please change the description for the figure and the caption for the graph to Ruthenium-106.

54. Table 3-2, Page WP 3T-2:

Deficiency: The table is incomplete.

Recommendation: Note that the radionuclide cumulative inventory accounts for decay to 1985 and include a complete list of dangerous waste disposed in this trench (see related comment on Section 3.1.1.1).

55. Table 3-3, Page WP 3T-3:

Deficiency: The table is incomplete.

Recommendation: Note that the radionuclide cumulative inventory accounts for decay to 1985 and include a complete list of dangerous waste disposed in this trench (see related comment on Section 3.1.1.3).

56. Table 3-9, Page WP 3T-9:

Comment: This table only lists units of mg/kg. However, the analytes include pH and conductivity which use different units.

Recommendation: Modify the table to incorporate the different units that may be necessary for the different analytes.

57. Table 3-12, Page WP 3T-12:

Comment: This table only lists hydrophilic organics found in trench sediments. Also, table labeling is unclear.

Recommendation: Provide a complete list of organic analytes, their detection limits, and concentrations. Clearly label the table as to which trench the samples were taken from.

58. Table 3-17, Page WP 3T-17:

Deficiency: The table is incomplete.

Recommendation: List the anions that were tested. State whether "Phenols" were total phenols or some other method.

59. Table 3-18, Page WP 3T-18:

Deficiency: The table is incomplete.

Recommendation: List the anions that were tested.

60. Table 3-22, Page WP 3T-22:

Deficiency: Nitrate and the radionuclides are described as secondary MCLs. This is not correct. They are primary constituents. Nitrate is listed as NO₃-NO₃ with a MCL of 45 ppm. However, in WAC 248-54 it is listed as NO₃-N which would have a MCL of 10 ppm. Some adjustment needs to be made to the table to reflect these discrepancies.

Recommendation: Please make the required changes to this table.

61. Section 4.1, Page WP 4-2, second paragraph of this page:

Deficiency: The wording of the second rationale for the technical approach is ambiguous.

Recommendation: Explain the phrases "streamlined approach with a bias for action" and "observational approach." These phrases are jargon and are not sufficient as a concept for the technical approach. The phrase "observational approach," in particular, is used throughout this section with no real definition of what it means.

62. Section 4.1, Page WP 4-2, first paragraph of this page, second bullet:

Deficiency: In the discussion of the rationale for the technical approach, the text indicates that data produced by the RFI field program must support development and evaluation of IRMs. The data should also support evaluation of final corrective measures to the extent practical, to minimize the potential for duplication of data collection efforts.

Recommendation: A preliminary list of final corrective measures should be discussed in the rationale for the technical approach.

63. Section 4.1.1.1, Page WP 4-3, second paragraph of this page:

Deficiency: The text indicates that a conceptual model is presented in chapters 2.0 and 3.0. Chapter 3 is inadequate as a conceptual model for the extent of contamination.

Recommendation: Changes in accordance with previous recommendations will have to be made. See recommendations for Section 3.1.

64. Section 4.1.2.1, page WP 4-5, first paragraph of section, fifth sentence;

Deficiency: The list of data types does not include river sediments. Although there are references to data collection under "100 Area

Investigations", there is no clear description of how those data will be analyzed and used in this study. Milestone M-30-01 references the "workplans"; the references are circular and do not provide needed information to guide the study.

Recommendation: State that data collection includes river sediments. Describe specific needs, e.g., are the five samples taken in the fall of 1991 considered adequate? State what additional work will be conducted.

65. Section 4.1.2.1, page WP 4-5, third bullet;

Deficiency: The text includes a statement on the "quantity . . . of contamination from retention basins and pipelines." Since retention basins and pipelines are not described in the 100-NR-1 source operable unit work plan, this statement should either be deleted or changed to reflect the actual activities that resulted in the release of contaminated water from storage structures and the resulting mound of groundwater that developed during operation of the N-reactor.

Recommendation: Please make the suggested changes to this statement.

66. Section 4.1.2.1, page WP 4-6, second and fourth bullet on this page;

Deficiency: There is no specific reference to data needs at N-springs. Are they to be inferred in bullets two and four of this page?

Recommendation: Describe specific data needs for N-springs.

67. Section 4.1.2.1, WP 4-6, second bullet on this page;

Deficiency: The data needed for "An understanding of the relationship between water-table fluctuations and release and transport of contaminants from the lower vadose zone and capillary fringe to ground water" is described as being derived from 100-Area aggregate investigations. The collection of this data is not explicitly described in milestone M-30, and we know of no other 100-Area aggregate investigation that would address this issue.

Recommendation: Data to evaluate the release of contaminants to ground water as a result of fluctuating water levels falls within the scope of the 100-NR-2 operable unit RI/FS and should be noted as such. The description of how these data will be gathered should be included in Section 5.1, subtask 6.

68. Section 4.1.2.2, page WP 4-6:

Comment: The appropriate time period for submitting the qualitative risk assessment methodology should be specified. (Wording in the HR-3 redline should address this comment. However, the HR-3 redline is presently being negotiated.)

69. Section 4.1.2.2, WP 4-6:

Deficiency: It is noted that determining the nature and vertical extent of contamination in the vadose zone should be sufficient for conducting a qualitative risk assessment at individual waste sites. This information may indicate what contaminants are present, but provides little guidance on potential future exposures. At a minimum, semiquantitative information on infiltration rates, soil hydraulic characteristics, and contaminant transport characteristics, will be required for a qualitative risk assessment.

Recommendation: In Section 4.1.2.2, note that information on contaminant transport characteristics will also be required for a qualitative risk assessment.

70. Section 4.1.2.2, WP 4-6:

Comment: It is stated here that "IRM's are initially anticipated at the high priority waste sources and for environmental media found to exceed threshold concentrations." What exactly constitutes a threshold concentration and how will it be determined? (Wording in the HR-3 redline should address this comment. However, the HR-3 redline is presently being negotiated.)

71. Section 4.1.2.3, page WP 4-7, last bullet in this section:

Deficiency: This section indicates that treatability study information relevant to the limited range of interim actions may be considered for source operable units from 100-NR-1 and the 100 Area aggregate CMS. The text does not specify whether treatability studies will be required for groundwater and aquifer soils within the source area for 100-NR-2 groundwater operable units and the 100 groundwater aggregate area CMS.

Recommendation: This section should clearly state that treatability studies will take place for remediation of contaminated aquifer soils and groundwater, applicable to the range of interim actions for the groundwater operable unit. (Wording in the HR-3 redline should address this comment. However, the HR-3 redline is presently being negotiated.)

72. Section 4.2.1.1, page WP 4-10, second bullet:

Deficiency: The IRM path is selected based not only on information in existing work plans and the collective knowledge of the three parties but also on data collected from analogous facilities at other operable units. The text should therefore include a reference to "data collected from analogous facilities at other operable units" after "existing work plans."

Recommendation: Please make changes to the text reflecting that the IRM path is selected based not only on the factors mentioned, but also on data collected from analogous facilities.

73. Section 4.2.1.2, page WP 4-11, second paragraph

Comment: The text refers to Table 4-2 for existing wells, satisfying priority-one and -two purposes. It is not clear from the table whether all the listed wells are CERCLA monitoring wells or if RCRA wells are also included in the list. This should be clarified.

74. Section 4.2.2, page WP 4-11, first paragraph of the section:

Deficiency: At the beginning of the paragraph, the text states that groundwater from two sampling rounds will be analyzed for a full suite of analytes. However, at the end of this paragraph, it states that it may not always be necessary to have two full rounds of sampling from all wells. Since available data have not undergone extensive quality control procedures, a minimum of two rounds of sampling from all wells will be required to reduce the list of parameters for application to subsequent sampling rounds.

Recommendation: Please make changes to the text in this section and in Section 5.0 to reflect the more conservative approach until more data is available.

75. Section 4.2.2, Page WP 4-11, first paragraph of this section:

Deficiency: Specific detection limits, quantification limits, and precision and accuracy are not defined in this section.

Recommendation: Reference must be made to the QAPjP, the operable unit-specific Description of Work (DOW), or other appropriate documents regarding these items. (Wording in the HR-3 redline should address this comment. However, the HR-3 redline is presently being negotiated.)

76. Section 4.2.2, page WP 4-12, third paragraph:

Deficiency: The text refers to the 100-NR-1 source Operable Unit Work Plan for collection of soil samples from selected liquid waste soil column disposal facilities for physical property data. However, physical property testing is not proposed for the 100-NR-1 investigation, because IRMs are proposed for the major high-volume radioactive liquid waste units (Section 4.2.2.1, 100-NR-1 work plan).

Recommendation: The EPA has sent out a letter proposing the collection of five samples from different depths in one borehole in each high-volume waste site or representatives of a waste facility type (emphasis added). Because of the unique characteristics of the 100-N Area, collection of samples to obtain physical property data should be considered from other representative waste sites such as 120-N-1, 120-N-2, 116-N-2, and 166-N at which vadose zone borings are planned. At these sites, either a high volume of liquid wastes are discharged or a high volume of unplanned releases have occurred.

77. Section 4.2.2, p. WP 4-12:

Comment: The reference to the USGS in regard to the plan for analyzing selected physical properties of soils should be removed. The plan was submitted by EPA. (Wording in the HR-3 redline addresses this comment. However, the HR-3 redline is presently being negotiated.)

78. Table 4-1, Page WP 4T-1a:

Deficiency: In the list of groundwater data, several data needs are missing. These include aquifer properties, input parameters for contaminant fate and transport models, and aquifer thickness and extent.

The table indicates that infiltration values will be based upon actual site surface conditions. There is no discussion of how this will be done in Sections 5.1.5.2 or 5.1.5.3.

Recommendation: Additional hydrologic properties, such as storativity (needed for evaluation of pump and treat technologies), leakage, and porosity (used in groundwater velocity calculations); input parameters (e.g., retardation) for the contaminant migration and fate models; and the thickness and extent of aquifers should be included in the table.

The measures that will be used to develop infiltration values should be described in Section 5.1.5.2 or Section 5.1.5.3, as appropriate. Presumably, this development will include onsite infiltration measurements. If this is not the case, the rationale for developing the values should include criteria for correlating offsite data to site conditions.

79. Section 5.1, page WP 5-1:

Deficiency: No tasks or subtasks are provided in this section or elsewhere to meet the following data needs:

- Groundwater recharge and discharge, and contaminant transport from off-site sources into the 100-NR-2 operable unit (Section 4.1.2.1)
- Treatability studies relevant to the limited range of interim actions that may be considered (Section 4.1.2.3)
- Nature and extent of soils contaminated by seeps at the river edge and the human and environmental risks posed by this soil (Section 4.1.2.4)
- Vertical gradient in contaminated hydrostratigraphic units at 100-NR-2

The way in which these data needs will be met should be explained either under separate tasks or under relevant tasks already included in Section 5.0.

Recommendation: Develop each subtask text. Draft text for regulator review should be available by 4/1/92.

80. Section 5.1, Page WP 5-1, fourth paragraph on the page:

Deficiency: There is no reference to a DOW or what a DOW is and how it works in the overall scheme of the operable unit characterization.

Recommendation: Discuss DOWs and how they are reviewed and implemented. (Some of this is addressed in the HR-3 redline)

81. Section 5.1.3.1, Page WP 5-4, fifth paragraph on the page:

Deficiency: The text does not indicate how the geologic data will be compiled into a map.

Recommendation: For a project of this size, all geologic information should be automated using either a CAD or GIS computer mapping system.

82. Section 5.1.3.2, Page WP 5-4, seventh paragraph on the page:

Deficiency: There is no explanation of why surface mapping is only proposed near the shore of the Columbia River.

Recommendation: Surface mapping should be done over the entire operable area. If this is covered in the 100-NR-1 work plan, clarify the text.

83. Section 5.1.4, page WP 5-5:

Deficiency: This section refers to Appendix D-1 for surface water and sediment investigations information. Appendix D-1 mainly addresses water and sediment sampling from springs and seeps; it does not address river sediment sampling. Fundamental information to guide the study must be in the workplan.

Recommendation: The approximate sampling locations adjacent to and in the vicinity of 100-NR-2 should be indicated on a map. The distance of sampling locations from the river bank should be included in this section. Task 4 in this section should be addressed separately for seeps and springs and for river water and sediments.

84. Section 5.1.5.2, p. WP 5-7:

Comment: See comment on Section 4.2.2 regarding reference to USGS. (Wording in the HR-3 redline addresses this comment. However, the HR-3 redline is presently being negotiated.)

85. Section 5.1.5.4, p. WP 5-7:

Geophysical logging is proposed for only the one new well in the N-Area. No gross-gamma or spectral gamma logging is proposed for existing wells in the N-Area.

Recommendation: A selection of existing wells in the N-Area should be logged with the gross gamma tool, and a subset of those should be logged with the spectral gamma tool to determine the extent of radiological contamination in the lower vadose zone resulting from past ground-water mounding. The work plan specifically should note the wells to be logged and should concentrate on those between 1325-N and the river. (See comment #11 addressing Section 2.2.2.2.3).

86. Section 5.1.6.2.1, page WP 5-11, fifth and sixth paragraphs on page:

Deficiency: The text should include the review meeting date and should reference any supporting document for the new monitoring well that was agreed upon by EPA, the Department of Ecology, and DOE.

The text refers to Section 5.1.6.2.2 for the depth of the proposed deep well; however the approximate total depth of the new well is not presented in Section 5.1.6.2.2.

Recommendation: This information should be provided.

87. Section 5.1.6.2.1, Page WP 5-11, fifth paragraph on the page:

Deficiency: Incorrect well siting information. Three proposed monitoring wells are shown on Figure 5-1. Only one well is proposed as part of this investigation.

Recommendation: On Figure 5-1, clearly identify which well is the one referenced in the text. Rewrite the text to indicate: "The location of the proposed deep monitoring well is between 116-N-1 and the Columbia River, as shown in Figures 5-1 and 5-2."

88. Section 5.1.6.2.1, Page WP 5-11, sixth paragraph on the page:

Deficiency: It is not clear whether the proposed new well will be the only well in the aquifer below the water table aquifer.

Recommendation: Clarify whether this will be the only well completed in the confined or semi-confined aquifer below the water table aquifer.

89. Section 5.1.6.2.2, p. WP 5-12:

Deficiency: It is stated that the uppermost aquifer will be cased and sealed before drilling into the deeper zones. However, no mention is made of testing the seal integrity. In the 300-FF-5 Operable Unit, a seal test plan (EMO-1029, AD-940) was written and used to test the integrity of seals before drilling into underlying aquifers.

Recommendation: Please include a plan or subtask for testing the seal integrity of the deep well.

90. Section 5.1.6.2.3, page WP 5-12, sixth paragraph on this page:

Deficiency: One of the objectives of soil sampling is stated as determining "whether the vadose zone may have been contaminated by higher groundwater levels associated with mounding, river interactions, or other groundwater fluctuations." Soil samples will be collected for chemical analyses at 10 feet and 5 feet above the water table and at 5 feet beneath the water table. It is not clear how the soil samples from the deep well at the proposed depth will provide data to meet the above-stated objective. Groundwater fluctuations associated with mounding and river interactions have occurred only in the unconfined aquifer.

Recommendation: This discrepancy should be clarified or the text should be revised, limiting the soil sampling objective to determining the

extent of contaminant sorption to the soil.

91. Section 5.1.6.2.3, Page WP 5-12, sixth paragraph on the page:

Deficiency: There are no provisions for sampling zones of apparent contamination that do not activate field screening instruments.

Recommendation: Provide for sampling visibly contaminated areas that do not fall on the preset sampling interval, particularly since many potential contaminants will not be detectable with field screening instruments.

92. Section 5.1.6.2.5, page WP 5-13:

Deficiency: The text should define the type of additional information on aquifer properties that will be derived from river-groundwater interaction studies.

Recommendation: Revise the text to clarify the additional information that will be derived from river/ground water interaction studies.

93. Section 5.1.6.2.5, p. WP 5-13:

Deficiency: It is stated that slug tests will be performed on all new monitoring wells.

Recommendation: It should be stated that all slug tests will be conducted with temporary casings and screens in place (prior to installation of sand packs).

94. Section 5.1.6.2.7, p. WP 5-13:

Deficiency: Quarterly water-quality sampling of monitoring wells will not be sufficient unless the effects of changing river stage can be identified.

Recommendation: Selected wells should be monitored on a continuous basis (sensors and recorders) for several basic parameters (e.g., temperature and specific conductance) in order to identify the effects of changing river stage on the water quality in the aquifer.

95. Section 5.1.6.2.7, Page WP 5-13, fourth paragraph on the page:

Deficiency: The description of wells to be monitored and of dedicated sampling equipment is insufficient.

Recommendation: Provide a figure showing the monitoring wells to be monitored for this study. If all of the wells shown on Figures 5-1 and 5-2 are to be monitored, clarify the text and reference these figures. Describe what kind of dedicated sampling equipment will be installed in all of the wells to be monitored.

96. Section 5.1.6.3, pages WP 5-13 and WP 5-14:

Deficiency: Ambiguous statements such as "where existing water quality data are insufficient to identify a reduced list of parameters" (first sentence) and "unless a reduced list of parameters can be identified from existing data" (second paragraph) should be deleted. Section 4.0 indicates that the amount and quality of available information are not adequate to quantify risks and complete the feasibility study. Further, the available data are not validated and do not include a full suite of analytes. Therefore, it is appropriate to specify that the first two rounds of groundwater samples will be analyzed for the full suite of analytes. Also, the last sentence of the second paragraph (page WP 5-14) should be moved to the end of the first paragraph for clarity.

The text in the first paragraph includes a statement that groundwater samples will be analyzed for only selected radionuclides; however, no rationale is provided. The selected radionuclides should be referenced here, along with an explanation of the reasons for limiting the analysis to those selected.

Recommendation: Please make the suggested changes to the text.

97. Section 5.1.8, Page 5-15

Deficiency: Section 5.1.8 references Appendix D for information regarding investigations to determine existing concentrations of contaminants in the Operable Unit. Appendix D doesn't contain enough information to validate this statement.

Recommendation: Please make changes to the text to reconcile this discrepancy.

98. Section 5.2, Page 5-19

Comment: The title of this section is misleading and should be changed. It is suggested that the title of this section be changed to the "Feasibility Study Tasks".

99. Section 5.2.2, page 5-19:

Deficiency: As specified in Section 5.2 of the 100-NR-1 work plan, solid wastes and sediments are not included in the first bulleted item for the 100-N Area CMSs; these should be included.

The second bulleted item applies to 100 Area soils but does not apply to groundwater, solid wastes, and river sediments. The text should reflect this in presenting all action-specific corrective action requirements (CAR) for soils, groundwater, solid wastes, and river sediments.

The establishment of preliminary remediation goals should be included in the third bullet.

In the fourth bullet, appropriate criteria (such as effectiveness, implementability, and cost) should be stated.

Recommendation: Please make the suggested changes to the text.

100. Section 5.2.3

Deficiency: This section does not identify all of the reports that must be addressed in the 100-NR-2 Focused Feasibility Study. See attached figure Title "Chapter 5 Flow Chart".

Recommendation: Revise the title of this section to the "100-NR-2 Focused Feasibility Study". Add bullets and discuss:

- 1) Soil Disposal Options
- 2) Risk Assessment Methodology
- 3) Hanford Background Report
- 4) River Impact Study
- 5) LFI Reports
- 6) Shoreline Study Reports
- 7) Ecological Study Report
- 8) Cultural Resource Study Report
- 9) Further clarification of ARARS
- 10) Summary of the 100 Area FS including treatability tests.

Deficiency: The analysis of IRM alternatives is part of the 100-NR-2 Focused Feasibility Study and will be subject to the FS process and criteria.

Recommendation: Revise the order of the nine criteria to be consistent with CERCLA guidance. It is important to list the criteria in order of importance because alternatives that do not pass the first level of the screening process may not be viable options for remediation. The order of importance is as follows:

Threshold Criteria	Overall Protection of Human Health and the Environment
	Compliance with ARARs
Primary Balancing Criteria	Long Term Effectiveness and Permanence
	Reduction in Toxicity, Mobility, or Volume Through Treatment
	Short Term Effectiveness
	Implementability
	Cost
Modifying Criteria	State Acceptance
	Community Acceptance

1.) "Overall Protection of Human Health and the Environment" should be the first subsection. Revise this section to be "5.2.3.2.1". Also include a discussion of the required No Action Alternative.

2.) "Compliance with ARARs" should be the second subsection. Revise this section to be "5.2.3.2.2". This should include a discussion of compliance with chemical specific, action specific, location specific, and other criteria such as advisories and guidance documents (To Be Considered ARARs). Note that, any remedial alternative that does not pass the threshold criteria cannot be discussed further in the evaluation.

3.) "Long Term Effectiveness and Permanence" should be the third subsection. Revise this section to be "5.2.3.2.3".

4.) "Reduction in Toxicity, Mobility, or Volume Through Treatment" should be the fourth subsection. Revise this section to be "5.2.3.2.4".

5.) "Short Term Effectiveness" should be the fifth subsection. Revise this section to be "5.2.3.2.5".

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6.) "Implementability" should be the sixth subsection. This section should list the following criteria:

- The ability to construct and operate the technology
- Reliability of the technology
- Ease of undertaking additional remedial actions if necessary
- Ability to monitor effectiveness of remedy
- Ability to obtain approval from other agencies
- Coordination with other agencies
- Availability of off site treatment, storage, and disposal services and capabilities
- Availability of prospective technologies

Revise this section to be "5.2.3.2.6".

7.) "Cost" should be the seventh subsection. Revise this section to be "5.2.3.2.7". The cost section should include a discussion of capital costs, operating and maintenance cost, and present worth cost.

8.) "State Acceptance" should be the eighth subsection. Revise this section to be "5.2.3.2.8". This section should include a discussion of the alternatives the state supports, the alternatives that the state has concerns with, and alternatives that the state opposes. Language about the role of the lead or support regulatory agency should be included.

9.) "Community Acceptance" should be the ninth subsection. Revise this section to be "5.2.3.2.9". This section should include a discussion of the alternatives the community supports, alternatives that the community has concerns with, and alternatives that the community opposes.

102. Section 5.2

Deficiency: This section should include all the reports that lead to the decisions. Each step results in a report, except that a detailed analysis of viable alternatives may be integrated with the report on the corresponding feasibility study. In CERCLA terms, those steps are:

- 1) IRM Focused Feasibility Studies
- 2) IRM detailed analyses of viable alternatives
- 3) IRM Proposed Plans
- 4) IRM RODs (written by regulators)
- 5) Operable Unit Remedial Investigation
- 6) Operable Unit Feasibility Study

- 7) Operable Unit detailed analyses of viable alternatives
- 6) Operable Unit Proposed Plan
- 7) Operable Unit ROD (written by regulators)

Recommendation: Include a discussion of each of the steps listed above.

103. Figure 6-1, Operable Unit Schedule, pocket insert:

Deficiency: The text at the bottom of the schedule includes a statement that Task 1 - Project Management is not applicable to this operable unit. But Task 1 - Project Management is included with the tasks to be performed during the RFI at the 100-NR-1 operable unit (Section 5.1) and discussed extensively in Section 5.1.1. The rationale for not showing Task 1 in the schedule should be explained, or Task 1 should be included in the schedule.

The schedule for activity 6b-5 - Aquifer Testing is not included; it should be.

Under Task 6, subtask 6.2.4 is incorrectly reported as "Air Monitoring." "Aquifer Testing" should be substituted for "Air Monitoring."

The subtask 6.2.5 - Groundwater/Soil Sampling is shown to take place for a period of approximately 3 months. Two rounds of groundwater sampling is planned (Section 4.2.2). The interval between sampling rounds should be described. Also, the schedule for quarterly sampling should be indicated.

The schedule for Task 13 - RFI report is misleading. The text in Section 5.1.13 states that RFI reports will consist of a preliminary summary of the characterization activities described in Tasks 1 through 12. Tasks 1 through 12 include a task for qualitative assessment of the risks associated with the operable unit. But the schedule for qualitative assessment is shown after completion of the RFI report. This discrepancy should be rectified.

The concept of interim records of decision (RODs) is not explained elsewhere and should be. According to the WHC/DOE letter report dated October 15, 1991 for the 100-NR-1 and 100-NR-2 operable units, achievement of RODs is through IRMs; that is, characterization data are collected concurrently with cleanup during the IRM. However, no IRM is proposed for the 100-NR-2 operable unit. Also, the schedule indicates approximately 4 years to implement an IRM plan after completion of RFI/CMS for the 100-NR-2 operable unit. The intention of the investigative strategy in rescoped work plans is to achieve earlier remedial action because the groundwater investigation within the 100-NR-2 operable unit has been determined by EPA, Ecology, and DOE to be a

high-priority activity. This fact is not reflected in the schedule. The above discrepancy must be corrected.

As stated in Section 6.0, the interim milestones established to track and ensure progress of the various tasks should be shown in the schedule.

Recommendation: Please make the suggested corrections and address the discrepancies noted.

104. Figure 6-1, Items 6.2.3 and 6.2.5:

Deficiency: Water-level measurements and ground-water sampling are scheduled to be done monthly and quarterly, respectively, for the first year after well installation and quarterly and semiannually, respectively, thereafter. However, the schedule as shown in Figure 6-1 indicates water-level measuring and ground-water sampling ending at the same time as the last well is scheduled for completion.

Recommendation: Please address the discrepancies noted.

THIS QAPjP IS BEING REVISED AND REDLINED IN PARALLEL TO THIS WORKPLAN. THE FOLLOWING COMMENTS MAY ALREADY HAVE BEEN ADDRESSED. HOWEVER, THEY WILL BE INCLUDED HERE TO PROVIDE SOME MEANS OF DETERMINING WHETHER THESE PARTICULAR CONCERNS ARE ADDRESSED BY THE REDLINE.

105. QAPjP, General:

Deficiency: Many documents and sections of documents are referenced in this QAPjP, but in most cases not enough information is given for the reader to understand what information is available in the referenced document. Several examples are given in the section-specific comments.

Recommendation: A brief synopsis of what information is available in each referenced document or section should be included in a table or, where appropriate, in the QAPjP text.

106. QAPjP Section 1.3, Page A-1, third paragraph:

Deficiency: This paragraph describes the guidelines under which Appendix A, the *Quality Assurance Project Plan (QAPjP)*, was developed. The paragraph states that the QAPjP is subject to mandatory review and approval by the Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) before use. However, Ecology's guidelines for QAPjPs are not cited as a source of guidance.

Recommendation: The QAPjP should be reviewed for consistency with Ecology's recent quality assurance guidelines, as presented in *Guidelines and Specifications for Preparing Quality Assurance Project Plans* (Washington State Department of Ecology, May 1991).

107. QAPjP Section 1.4, Page A-2, first paragraph:

Deficiency: Little detail is included on the project design, such as how the project activities are inter-related and how they will achieve the project objectives.

Recommendation: Include descriptions of the proposed sampling frequency and locations, how these would relate to the expected temporal and spatial variability of the parameters of interest, proposed dates of activities, and any limitations imposed on the schedule. If these types of information are to be included in the operable unit-specific DOW, then it should be so stated.

108. QAPjP Section 2-2, page A-2:

Deficiency: The basis for selecting the criteria of 200 pCi/g for total activity and 60 pCi/g for alpha activity to determine whether the sample is radioactive or nonradioactive should be provided or referenced.

The text should also explain whether the proposed criteria are for soils only or for soils, sediments, and solid wastes. If for soils only, the criteria to be used for sediments and solid wastes should be included as well.

Recommendation: Add text as described above.

109. QAPjP Section 2.2, Page A-2, fourth paragraph:

Deficiency: No SOP is identified for determining whether a sample is radioactive and will require special handling.

Recommendation: Describe the procedures to be used for identifying and handling radioactive samples. If SOPs exist, they should be referenced and abstracts of the procedures provided in the text.

110. QAPjP Section 3.0, Page A-3, fourth paragraph:

Deficiency: The criteria to be used for varying the data quality objectives are not discussed.

Recommendation: The text should provide a discussion of the criteria for varying the data quality objectives, such as method quantification limits and precision and accuracy target values listed in Table QAPjP-1. If this information is contained in another document, such as an appropriate operable unit-specific DOW, that document should be referenced.

111. Table QAPjP-1, p. A4-A6:

Deficiency: The text in Sections 4.2.2 and 5.1.6.3 states that samples collected for chemical analysis will be analyzed for the full suite of CERCLA target compound list (TCL) organics and for radionuclides. But only four radionuclides are included in this table. What is the rationale for not analyzing all the radionuclides listed in Table 3.4.2?

Recommendation: Add necessary radionuclides to Table 3.4.2.

112. Table QAPjP-1, Pages A-4 through A-6:

Deficiency: A complete list of the target organic compounds of interest for the project is not provided in this table.

Recommendation: Revise this table to list the individual target analyte list (TAL) compounds, rather than just referring to "TAL Volatile Organics," "TAL Semivolatile Organics," and "TAL Pesticide/PCBs."

113. Table QAPjP-1, Pages A-4 through A-6:

Deficiency: The limits for precision and accuracy for soils in this table may not be realistic.

Recommendation: Unless the laboratory performing the analyses can easily achieve the stated limits, the recommended precision should be at 30 percent relative percent difference and the accuracy should be at least 35 percent relative percent difference.

114. Table QAPjP-1, Pages A-4 through A-6:

Deficiency: Target quantification limits are not given in this table for either soil or water.

Recommendation: Provide the target quantification limits for soil and water in this table, rather than referencing a method.

115. Table QAPjP-1, Page A-5:

Deficiency: No information is provided for carbon-14.

Recommendation: Provide carbon-14 analytical methods, target quantification limits, and precision and accuracy requirements for both soil and water samples.

116. QAPjP Section 4.2.1, Page A-8, second paragraph:

Deficiency: Not enough information is provided in this section on the different sampling methods that will be used.

Recommendation: In cases where other documents are referenced, the text should provide a brief synopsis or abstract of the information provided in the referenced document. For example, for EII 5.9, *Soil Gas Sampling*, the type of monitor or equipment that may be used should be specified.

117. QAPjP Section 4.2.1, Page A-8, second paragraph:

Deficiency: No criteria are provided on how sample locations will be chosen.

Recommendation: The text should provide this information or reference the appropriate operable unit-specific DOW for specific information about sampling.

118. QAPjP Section 4.2.1, Page A-8, second paragraph:

Deficiency: EII 5.9, *Soil Gas Sampling*, is referenced as being applicable in Section 4.2.1, but is not included in Table QAPjP-2.

Recommendation: Revise Table QAPjP-2 to include EII 5.9.

119. QAPjP Section 4.2.2, Page A-8, third paragraph:

Deficiency: Not enough detail is provided in the text regarding sample containers, preservation, and selection criteria.

Recommendation: A table listing type of sample or analyte, sample container and cap type, preservation requirements, preparation requirements, and special handling requirements should be included in this section. The text should be expanded to include selection criteria for sample containers.

120. Table QAPjP-2, Pages A-9 through A-10:

Deficiency: EII 2.3, *Administration of Radiation Surveys to Support Environmental Characterization Work on the Hanford Site*, is not listed in Table QAPjP-2.

Recommendation: EII 2.3 should be listed in Table QAPjP-2.

121. Table QAPjP-2, Page A-10, footnote e:

Deficiency: Laboratory data validation should be carried out following *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (USEPA, July 1988) or *National Functional Guidelines for Organic Data Review* (USEPA, June 1991), when appropriate.

Recommendation: Reference these two documents as required guidance for laboratory data validation.

122. QAPjP Section 7.0, Page A-12, first paragraph:

Deficiency: The criteria to be used for varying the analytical methods, the method quantification limits, and the precision and accuracy target values listed in Table QAPjP-1 are not discussed.

Recommendation: The criteria for changing the analytical methods or procedures, method quantification limits, and other specifications listed in Table QAPjP-1 should be provided.

123. QAPjP Section 7.0, Page A-12, second paragraph:

Deficiency: No information is provided in this section of the standard units that will be required for analytical procedures.

Recommendation: This information should be provided, or the appropriate document that contains this specific information should be referenced.

124. Table QAPjP-3, Page A-13:

Deficiency: Criteria upon which the method to determine soil physical parameters will be selected are not provided.

Recommendation: Criteria for selecting the method to determine soil physical parameters should be provided. Standard methods of analysis (e.g. Annual Book of ASTM Standards, 1991) should be discussed in the text.

125. Table QAPjP-3, p. A-13:

Comment: Footnote B states that methods for bulk density, moisture retention, and unsaturated hydraulic conductivity shall be developed and submitted to Westinghouse Hanford for review and approval prior to use. It should also be noted that these methods will require regulatory review and approval as well.

126. QAPjP Section 8.2, Page A-14, second paragraph:

Deficiency: Laboratory data validation should be carried out following *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (USEPA, July 1988) or *National Functional Guidelines for Organic Data Review* (USEPA, June 1991), when appropriate.

Recommendation: Reference these two documents as required guidance for laboratory data validation.

127. QAPjP Section 8.4, Page A-15, second paragraph:

Deficiency: The text does not make clear who is responsible for evaluating the data.

Recommendation: The individual or group responsible for performing data evaluations should be designated.

128. QAPjP Section 8.4, Page A-15, second paragraph:

Deficiency: Procedures for sample identification, data entry, and data revisions in the HEIS database are not referenced.

Recommendation: Expand the text to describe how the data will be entered into HEIS.

129. QAPjP Section 10.0, Page A-17, fourth and fifth paragraphs:

Deficiency: The terms "regularly" and "routine" are used to describe the frequency of auditing activities.

Recommendation: Specify the minimum frequency at which each of the auditing activities will be performed.

130. QAPjP Section 11.0, Page A-17, sixth paragraph:

Deficiency: The information provided on preventive maintenance procedures is insufficient.

Recommendation: A table, including type of equipment, frequency and type of maintenance, and reference document(s) for performing the preventive maintenance, should be included.

131. QAPjP Section 13.0, Page A-18, third paragraph:

Deficiency: No time frame for procedural or plan corrections is provided.

Recommendation: A time frame for resolution of procedural or plan corrections should be provided.

132. QAPjP Section 13.0, Page A-18, third paragraph:

Deficiency: Laboratory corrective actions and quality control procedures are not discussed in this section. Since we do not have the laboratory documents, we are not certain that the necessary quality control procedures are in place.

Recommendation: Expand the text to provide a description of these activities. If possible, reference appropriate documents, such as the laboratory quality assurance program plan.

133. QAPjP Section 13.1, Page A-18, fourth paragraph:

Deficiency: No procedures are provided regarding the fate of data or samples collected, if equipment is found to be operating outside acceptable operating ranges or used after the expiration date for calibration.

Recommendation: If no existing procedure covers resampling or reanalysis under these circumstances, one should be generated; if one exists, it should be referenced and an abstract of the procedure included in the text.

134. QAPjP Section 14.0, Page A-19, third paragraph:

Deficiency: The term "regularly" is used to describe the frequency of auditing and associated corrective action processes.

Recommendation: Specify the minimum frequency at which these activities will be performed.

135. QAPjP Section 14.0, Page A-19, third paragraph:

Deficiency: No schedule is given for the generation of quality assurance reports.

Recommendation: A schedule for submittal of quality assurance reports should be provided in the QAPjP, or provided in the work plan and referenced in the QAPjP.

136. QAPjP Section 14.0, Page A-19, third paragraph:

Comment: Reference is made to Chapter 1.0 for Task 12, but Task 12 is not discussed in Chapter 1.0 of either the Work Plan or the QAPjP.

Recommendation: Correct this reference.

137. QAPjP Section 14.0, Page A-19, third paragraph:

Deficiency: Assessment of data accuracy and completeness is not mentioned as being included in any report but the final quality assurance report.

Recommendation: An assessment of data accuracy and completeness should be included in each quality assurance report.

138. Appendix D-1, Section 3.0, page D1-2:

Deficiency: A task for river water and sediment sampling and analysis to meet the goals and objectives presented in Section 2.0 (page D1-1) is not included and should be.

Recommendation: Please include a task for river water and sediment sampling and analysis.

139. Section 3.3, p. D1-3:

Deficiency: There is no mention of mapping the geology in the "geologic mapping" section.

Recommendation: Please modify the title of this section or include geologic mapping.

140. Section 3.4, p. D1-3:

Deficiency: The one-hour period for measuring trends in conductivity, pH, and temperature is insufficient.

Recommendation: The period of trend watching has to be increased. The needed length of the period could be determined by investigating the nature of trends in water quality at springs, water levels in near-shore wells, and river stages at a few locations for a period of several days. The observed relationships should allow us to determine the needed period of trend monitoring for all seeps/springs.

141. Appendix D-1, Section 3.4, Page D1-3, fourth paragraph on this page:

Deficiency: The description provided here is deficient as it does not provide a sufficient level of detail to substantiate the adequacy of the sampling and analysis program.

The text should clearly specify that field work will include a round of sampling (water and sediment) from every non-submerged spring and seep in the vicinity of 100-N Area in conjunction with the surface water and sediment investigation for the 100 Area.

This section does not address sampling of soils contaminated by seeps at the river edge to satisfy the data requirements presented in Section 4.1.2.4 (work plan). Near-shore river water sampling is planned but river sediment sampling is not addressed. The text should clearly state that soils contaminated by seeps at the river edge, river water, and river sediments will be sampled in the vicinity of the 100-N Area to meet the data requirements and objectives specified in the work plan and Appendix D-1. The text in Section 2.0 (Appendix D-1) clearly states that the objectives of the investigation are to identify and characterize, to the extent possible, the current (emphasis added) distribution and levels of contaminants present in Columbia River water and sediment.

Recommendation: This section should be expanded to provide greater detail regarding items such as identification and selection of specific sampling locations, number of samples to be collected, selection of specific contaminants for monitoring, etc. Details that are more appropriately addressed in the sampling and analysis plan need not be repeated here, but a summary describing details to be addressed later may be appropriate.

The section should provide enough detail to demonstrate that the scope of the sampling/monitoring program is complete, and sufficient to satisfy the anticipated data needs of other tasks, such as risk assessments. For example:

- Section 3.1.3.2.3 (WP 3-21) provides a summary of groundwater contamination in the 100-N Area. However, many of the contaminants listed in this section (e.g., cobalt-60, ruthenium-106, cesium-137, antimony-125, uranium, radium, various volatile organic compounds, and inorganics such as nitrate and sulfate) are not included in the list of target parameters for water or sediment samples described in Appendix D-1 (Section 3.5, page D1-4).
- Note that Table 3-42 (WP 3T-42) provides a preliminary list of contaminants of interest for the 100-NR-2 Operable Unit that includes cobalt-60, ruthenium-106, cesium-137, uranium, chloroform, and several inorganics such as nitrate and sulfate.
- Note that the McCormack and Carlile (1984) survey described on page WP 3-25 states that tritium, nitrate, and uranium were used as indicators of contamination and that elevated levels of these indicators were observed during 1982-83.
- Note that the first full paragraph on page WP 3-27 states that there continues to be measurable releases of some radionuclides from seeps and springs, most notably tritium, cobalt-60, strontium-90, and antimony-125.
- Note that Figure 3-21 (WP 3F-21) documents groundwater seepage of strontium-90 and ruthenium-106 to the Columbia River, and Figure 3-22 (WP 3F-22) documents similar groundwater seepage of iodine-131 and cobalt-60. (Note also that because the y-axis is logarithmic, rather than arithmetic, a *decline* to the "baseline", i.e., 0.1 Ci released, does not represent the *elimination* of discharge.)
- It is possible that other site-related contaminants (e.g., sodium, sulfate) may continue to mobilize the radionuclide contaminants that, if analyzed for, would potentially be detected during the N Springs sampling program required for the Tri-Party Agreement Milestone M-30-01 report.

The detailed justification for removal of any of the known or suspected contaminants from the sampling program should be provided.

Since risk assessment will be based, in part, on U.S. EPA guidelines for Reasonable Maximum Exposure (RME) concentrations of chemicals, it will be necessary to collect a sufficient number of samples to compute the 95% upper confidence limit of the arithmetic average concentration

(e.g., see page 6-19 of *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual*, U.S. EPA December 1989). The number of samples to be collected should be identified and reported in Appendix D-1.

Items discussed in other sections of the Work Plan (e.g., the Quality Assurance Project Plan) need not be repeated here, but should be cross-referenced as appropriate. Provide a detailed outline of the M-30-01 report evaluating the impacts to the Columbia River from contaminated springs and seeps for the operable units in the 100 Area, as proposed for submittal to EPA and Ecology.

Also, a map indicating approximate sampling locations or river reach (in river kilometers) in the 100 Area locating individual 100 Areas such as the 100-N Area should be included. At a minimum, previous sampling locations should be shown with a footnote explaining that field work during the low-flow stage will locate the existing and new seeps and springs in the 100 Areas, including the 100-N Area.

142. Appendix D-1, Section 3-5, page D1-4;

Deficiency: A rationale for analyzing water and sediment samples for selected radionuclides and for not analyzing organics should be provided. The existing data for springs and seeps are for radionuclides and inorganics only and are unvalidated. Limited, or no data exist for organic contamination. Also, many radionuclides were detected in the Columbia River water and sediments (Section 3.1.4). Data on chemical characterization of sediments are not currently available (Section 3.1.4.4).

Recommendation: The water and sediment samples from springs and seeps and from the river should be analyzed at a minimum for a full suite of analytes (as stated in Section 4.2.2) for an initial round of sampling.

143. Section 3.6, p. D1-5;

Deficiency: Only three wells are scheduled for water-level recorders in the vicinity of each of the river-stage recorders. Three are not sufficient for analysis of the river-aquifer connection.

Recommendation: In the vicinity of each river-stage recorder, we should have three wells in a line parallel to the river and three wells in a line perpendicular to the river. These two lines can (and should) intersect, resulting in five wells needed to construct the two lines. If a "reference" well is needed (i.e., a well which will be used to eliminate the effects of partial penetration of the river and "skin effects" of the river bed), then a sixth well may be necessary. All of these wells should be continuously measured for selected water-quality

parameters (e.g., temperature and specific conductance) as well as for water levels.

144. Appendix D-2, Section 3.2, Page D2-3, fifth paragraph:

Deficiency: This section says nothing about how data will be collected. The section describes previous surveys that were conducted to evaluate contamination of fish involved in exposure pathways to humans (e.g., fish that are permanent residents of the Hanford Reach of the Columbia River and that are consumed by humans). This section is deficient in that it does not discuss or present the results of these previous surveys.

Recommendation: This section should be expanded to provide greater detail regarding the results of previous surveys and how new data will be collected. For example, data should be presented showing contaminants identified in edible fish tissues, ranges of concentrations or activities of identified contaminants, and some basis for comparison with uncontaminated (control) fish and/or regulatory standards or guidelines for acceptable levels of specific contaminants.

These data would be valuable in substantiating the need for, and adequacy of, continued monitoring and sampling programs to evaluate the impacts of discharges from the N Springs on the Columbia River. These data would also be valuable as points of reference in the proposed risk assessments of the public health and environmental impacts of the N Springs discharges. Note that these data have direct bearing on the validity of any conclusions regarding "imminent and substantial endangerment", e.g., to humans through the fish ingestion pathway, and to the environment in terms of exposure of aquatic organisms and higher predators such as fish-eating birds of prey.

REFERENCES

- DOE, 1991. Letter Report for Rescoped Work Plans for the 100-NR-1 and 100-NR-2 Operable Units. U.S. Department of Energy. September 30, 1991.
- EPA, 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. EPA/540/1-89/100. U.S. Environmental Protection Agency. October 1988.
- EPA, 1991. EPA Region 10 Supplemental Risk Assessment Guidance for Superfund. U.S. Environmental Protection Agency. August 16, 1991.

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